

True Stories and Triumphs of Modern Exploration



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CHANGTZE FROM THE CAMP ON THE CHANG LA

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Chap. IX

Frontispiece

TRUE STORIES AND TRIUMPHS OF MODERN EXPLORATION

By

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Contents

TRUE STORIES

CHAP.		Page
	FOREWORD - - - - -	5
I.	ON THE HEADWATERS OF THE AMAZON - - -	9
II.	LOST IN THE DESERTS OF CENTRAL ASIA - - -	20
III.	DR. NANSEN'S POLAR SLEDGE JOURNEY - - -	35
IV.	INCIDENTS OF AFRICAN TRAVEL - - -	50
V.	FURTHER ADVENTURES ON THE AMAZON - - -	66
VI.	HARD TIMES IN GREENLAND - - -	81
VII.	IN THE WILDS OF NEW GUINEA - - -	89
VIII.	ENDURANCE IN THE ANTARCTIC - - -	100
IX.	THE ATTACK ON MOUNT EVEREST - - -	110
X.	WITH GEOLOGISTS IN NORTHERN CANADA AND ALASKA	134
	AFTERWORD - - - - -	149
	APPENDIX - - - - -	151

TRIUMPHS

	FOREWORD - - - - -	161
I.	IN AND AROUND LHASA, THE FORBIDDEN CITY - -	165
II.	THE CONQUEST OF RORAIMA - - - - -	190

Contents

CHAP.		Page
III.	SIR JOHN MURRAY, AND THE BOTTOM OF THE SEA -	204
IV.	PERSEVERANCE PEARY - - - - -	227
V.	IN INDIAN BORDERLANDS - - - - -	258
VI.	ADVENTURES OF THE DUKE OF THE ABRUZZI - -	270
VII.	THE ATTAINMENT OF THE NORTH POLE - -	289
VIII.	DR. THORODDSEN, GEOGRAPHER OF ICELAND - -	305
	APPENDIX OF MAPS -	313

Illustrations

TRUE STORIES

	Facing Page
CHANGTZE FROM THE CAMP ON THE CHANG LA	<i>Frontispiece</i>
SVEN HEDIN - - - - -	24
THE START FROM THE "FRAM" - - - - -	41
BOYD ALEXANDER - - - - -	56
IN THE UPPER HEATH RIVER - - - - -	73
ICE GROTTO IN LAT. 70° N. - - - - -	88
"ENDURANCE" IN THE ICE - - - - -	105
DR. TYRRELL'S PARTY ON DUBAWNT LAKE - - - - -	136

TRIUMPHS

THE POTALA, LHASA - - - - -	184
RORAIMA - - - - -	201
H.M.S. "CHALLENGER" - - - - -	208
COMMENCEMENT OF RAPIDS ON THE SANPO OR UPPER BRAHMA- PUTRA - - - - -	264
QUEEN MARGHERITA AND QUEEN ALEXANDRA PEAKS - - - - -	281
SNAEFELLNESS RANGE FROM HELGAFELL, ICELAND - - - - -	305

MAPS—APPENDIX

TIBET MISSION, 1903-4. — ASCENT OF MT. RORAIMA — CRUISE OF
H.M.S. "CHALLENGER" — ROUTES OF REAR-ADMIRAL R. E. PEARY
— BRAHMAPUTRA-SANPO — MT. ST. ELIAS.

'TRUE STORIES

*To every boy and girl who has any desire to roam
over the wilder parts of the world, this book of
real adventures is dedicated.*

Foreword

My young friend Tom and I have several points of mutual interest. Tom, who is just fourteen, hates schools, and I have no particular love for them either. His weakness in algebra, combined with my knowledge thereof, furnishes me with many a knotty problem in square roots and equations that will not equate. Tom enjoys devouring books of travel—not literally, of course—whilst my own rather wide travels serve to check his stories by my own experiences. This last subject, in particular, often affords us matter for a chat upon remote places.

Unhappily Tom's affairs are approaching a crisis. The awkward question of a career has been put before him more than once in recent months. His own ideas upon the subject are very definite. He wants to be an explorer. The ideas of Tom's father are equally definite, but in the opposite direction; for he is an accountant, in whose eyes offices and book-keeping make up the sum of life.

Tom and his father were discussing this important question one very cold and stormy winter's evening when I chanced to be present. As always happens at such times I was appealed to in support of parental authority. Although my sympathies were with Tom, I had to comply; for adults, you know, must stick together no less than boys do. The League of Parents has always existed for the purpose of frowning upon the League of Sons, and probably it always will.

"Tom," said I, in this difficulty, "have you ever sat down and considered just *why* you want to be an explorer or what you want to explore?"

"Well, I think it's a fine life going about the world seeing

things and discovering new countries and all that," said our young Stanley.

"But even if you could do this—and there are not many new countries left, I am afraid, in these days—what would you get out of it?"

"Kudos!"

"You can't live on that for long, Tom."

"Well, then, I would give lectures, and show cinematograph films, and generally advertise myself, just as other explorers do."

"That sounds easy enough," said I, laughing, "but you have not realized all the things that an explorer must know before he sets out to prove himself a hero."

"I suppose he would have to make maps and stuff of that sort; but if it couldn't be helped I should have to do the same," said Tom. "Anyhow, I am learning trig. now; and though I don't relish the stuff, I might stick at it if it was to be any good to me."

"Spoken like a man! But that isn't all, Tom. In addition to making maps, your explorer must be able to find his way without them, that is, by compass, and by observations of the sun and stars. Then he must be accurate, painstaking and patient, ready to learn, and capable of accommodating himself to the ways of the people amongst whom he is cast. He should be a good collector of animals, plants, and rocks; a first-class shot; quick-witted in times of danger; capable of picking up scraps of foreign tongues without difficulty; and——"

"You want an Admirable What-is-it, not an explorer!" said Tom, a little daunted.

"Oh, but I have not exhausted the list yet. Nowadays your explorer is nearly always the servant of someone else. His job may be to find out where valuable products occur, such as timber, rubber, oil, or gold; in fact, your best chance would lie in this direction, that is, as a scientific prospector. Besides the roughness of the life, however, you would require a thorough knowledge of the article you were seeking, and if this were gold or silver, it would take years to acquire such knowledge."

"Even if it did, it would be worth it, for there must be lots of fun in such a life," said the boy stubbornly.

"Oh, lots! What time you were not being eaten up by mosquitoes, stung by poisonous flies, or laid on your back by fever, you might spend in quarrelling with other prospectors, in getting unwilling carriers to do your bidding, or in starving in some God-forsaken hole hundreds of miles from anywhere. All sorts of horrible deaths come to prospectors, quite as a natural thing. Snakes may bite them in the middle of the night. Panthers or lions may track them down from behind without giving them a chance to shoot. But slow starvation is usually the worst end. There isn't much kudos in that, is there?"

"No-o."

"But," said I, thinking to push home my advantage, "if you still seriously imagine that you would like to become an explorer, I will tell you a few facts that I know about real explorers and how *they* fared; that is, if you want me to."

"Rather!" was the unexpected answer.

"Of course," said I, trying to hedge, but too late, "they will not be as exciting as Deadwood Dick tales or anything of that sort. On the other hand they are adventures that really did happen, which is a slight advantage, of course."

"I should say so," said Tom. "First tale this evening, please!"

Thus was I, in technical parlance, "let in for it", and that is how I came to write this book.

CHAPTER I

On the Headwaters of the Amazon

Six years ago I stood in the little Peruvian town of Oroya, more than 13,000 feet above the sea, looking eastwards along the highest railway line in the world.

A few stations distant, this railway ended uselessly; and I was there in connexion with its extension farther east—through mountains, down the steep sides of hills, and across the dense border of a tropical forest, to a spot, 300 miles off, where a deep but minor tributary of the vast river Amazon flowed.

A large smelter, furnishing employment for hundreds of men, had just been erected at Oroya; the red copper ingots produced in it filled trucks at my side. This material was destined for Europe. Under existing conditions, it had to cross a great snowclad mountain chain, passing thence over the barren western side of Peru to the Pacific Ocean; it had then to be shipped more than 1300 miles to the Panama Canal, before it even reached the Atlantic. Once the railway was completed, however, large river steamers would be able to take those ingots, without let or hindrance, down the mighty Amazon waterways straight into the ocean, thereby saving much time and money.

Up there upon the plateau, all around Oroya, lies an incredible amount of mineral wealth—rich gold veins copper deposits, silver, and so forth, besides many traces of valuable petroleum. Only a short distance

10 Modern Exploration — Stories

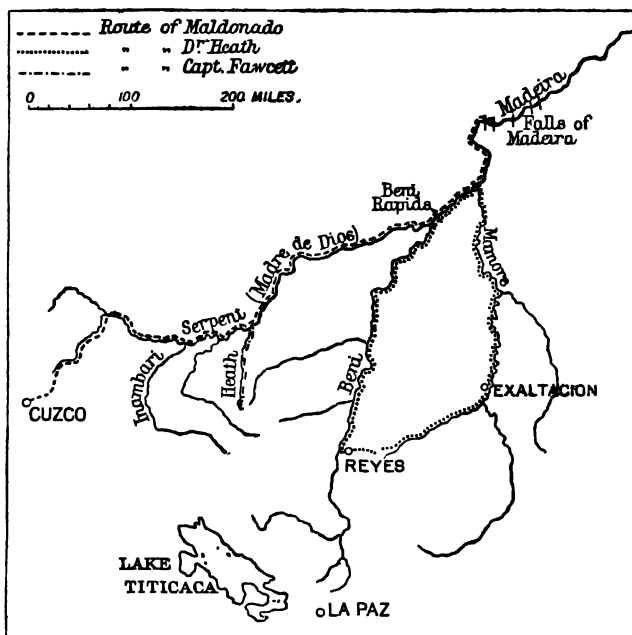
away, on the eastern side of the mountains through which the railway must be built, coffee, cinchona, beautiful hardwoods, and many other products occur; while on the low-lying Amazon plains are masses of wild rubber trees. All these things have at present but a slight commercial value; because there are no roads, no railways, and therefore no people.

The problem which this railway is attempting to solve has exercised the Peruvians of the high Andean plateau for many years; but so great are the difficulties of the descent to the Amazon headwaters, that although three railways have climbed to the plateau from the Pacific coast, none, as yet, has descended more than a little way on the other side.

In earlier days, 60 or 70 years ago, matters were still more complicated, because nobody knew whither the rivers flowed. The dread of the forest—offering, as it did, a choice between death by starvation, by shipwreck among alligators, or by cannibal Indians—effectually stopped most travellers before they had penetrated far into the terrible wilderness. On the other side, too, explorers advancing westwards from the mouths of the rivers were invariably turned back by rapids, by lack of food, or by hostile savages.

Two noble streams, the Madre de Dios (Mother of God) and the Beni, rise on the margin of the high plateau, the former near the ancient Peruvian city of Cuzco, and the latter near the Bolivian capital, La Paz. After descending to the plains, they were known, at that time, only as broad silent waterways, flowing off into the unknown east; and although numerous efforts were made by the hardy mountaineers to descend them, they were always defeated by the difficulties of which I have told you; some parties, indeed, were practically destroyed by the Indians, and others vanished, never to

be heard of again. It is the first descent of these two streams to their mouths that we will follow; for it displays—in daring, in stoicism under suffering, and in resourcefulness—many of the best qualities of explorers.



The Headwaters of the Amazon
(To illustrate also Chapter V)

First of all let us take the Madre de Dios, locally known as the Serpent River, because of its many windings.

Inspired by an adventurous Italian friar, there had been a sort of geographical society in Cuzco for several years; its aims being to improve the knowledge of the Amazon wildernesses, as well as of the giant snowclad peaks that frowned upon them. We need not wonder at this, for

12 Modern Exploration — Stories

it would be strange indeed if enterprise were lacking in such a place, where the traditions of the heroic Incas, battling against the strength and artfulness of Spain, were to be met with at every step.

One of the most notable members of the society was a gallant native of Cuzco, Don Faustino Maldonado. Planning to float down the Serpent River, regardless of where it might lead, and vowing to perish rather than return defeated, he inspired others with the same determination, so that he was soon able to muster his brother Gregory and six loyal young comrades for the projected expedition. They had no idea of the magnitude of what they had undertaken; were ill provided with food, insufficiently armed, and inexperienced; but their enthusiasm more than made up for these defects.

On Boxing Day, 1860, amid the hurrahs of their friends—some of whom must have witnessed their departure with sad forebodings—these eight bold men left the comfort of the city to descend the eastern wall of the mountains to the Serpent River. It was not long before their troubles began.

At first the road led down through tall grass, winding among many hawthorn and other thickets; then it became a mere track, unpaved, and with many patches of sticky mud; soon, too, the outskirts of the forest began to enclose it, as with giant leafy arms. The party passed through a region where dense white mists prevail for much of the day; then up and down terribly steep hills, first to the top, then to the bottom, then to the top, until they were thoroughly wearied; for the track was only a succession of rough steps, worn by generations of Indians and settlers; roots crossed it like huge writhing snakes, tripping up our travellers; branches swung in their faces; and soon the deep ruts allowed the vegetation to interlace overhead, so that only occasionally did they

see the light of day. On their left hand, behind the trees and shrubs, a cliffy slope stretched down to a rushing torrent; the noise of the water warned them that a false step in that direction meant death. As it was, the path sometimes emerged abruptly on the edge of this cliff, necessitating a hand-and-foot scramble over the slippery moss and lichen, with the imminent risk of falling at any moment into the river below.

At night they slept beneath trees or overhanging rocks, grateful for even that poor shelter from the mist and rain, for they had no tent; and after a time they had to be careful even about lighting fires, because of the possibility that savage Chuncho Indians might be roaming about the forest. Sometimes the wretched path failed them altogether; forcing them to climb up the slippery rocks by improvised ladders made of vines, or perchance almost down to the hissing water, before they could pass; at such places, mosquitoes were sure to lurk in thousands. Finally, they passed the last deserted shelter, or *tambo*, upon this miscalled "road"; and from now onwards their journey to the Serpent River was made through virgin forest.

These forests are wonderful and terrible places. Enter one but a few hundred yards, and you are surrounded by trunks, thin and stout, shapely and horribly misshapen, the upper parts of which are lost in a roof of foliage. Many of them are bound about with woody lianas, like giant ropes; and most of them are draped in moss, which is constantly wet. There are few or no flowers. The light is feeble, like that of evening. Shrubs, ferns, and smaller plants fill up every available inch of ground around you. In the mysterious gloom, you can hear yourself breathe, it is so silent; and your nerves are so keyed up, that when a sudden crack announces the falling of a tree, or the screech of some animal rings

14 Modern Exploration — Stories

through the wood, you start in alarm. As night falls, and the shadows deepen, a myriad ghostly forms seem to steal from tree to tree, enveloping you in their evil ring; and suddenly, the nocturnal world awakes, and the cries of monkeys, the calls of birds, the croaking of toads and frogs make the air resound for hours with a terrible hubbub.

Such was the place into which Maldonado and his seven fellow-travellers passed; but in their case there was the additional fear—based on a very real possibility—that stealthy feet might follow them, that arrows might unexpectedly dart out from the bushes, or that a panther might fall upon them from an overhanging branch. Of minor troubles there was no end. Ants, which inflict a bite like a stab from a red-hot needle, were swept on to their clothes from the bushes; and they always had the dread of the vampire bat, which bites one's toes at night, and is the scourge of this district. Add to all this an insufficiency of food (for they had nothing beyond what each man carried); the musty air of rotting plants; the never-ending labour of cutting a way through the scrub with their knives; and the desperate nature of their enterprise, and you will be sure that Maldonado's party were glad to reach the river's brink. It was like heaven, to emerge into daylight from those gloomy depths. They had now been travelling a month; their food had practically all gone; and there was no hope of any replenishment, save from the very scanty natural resources of the country through which they were passing.

If anyone thought of turning back, none dared mention it. Wild bananas and yucca could be gathered; and they had still a little ammunition. With quiet courage they cut a way through the brakes and undergrowth to the water; found suitable poles of light wood; tied them

together by means of rubber vines, and so made a raft that was strong enough to carry the whole party. This took several days, during which food gave out completely, and they had to interrupt the work in order to gather wild bananas. The river, it is true, swarmed with fish, but the party had chosen the wrong season for their work, when the streams were all in flood, and fish most difficult to catch. Besides, they had neither tackle nor the means of making any.

Early in February the raft was finished, and they embarked; there could be no possible turning back now. In this act we see the strong will and set purpose of the leader. Death or success was his motto, and he adhered to it inflexibly.

Their troubles now began to multiply. The frail structure, with its heavy human freight, was soon caught in a string of rapids; swinging round in the whirlpools, it dipped beneath the waves; but its buoyancy kept it afloat, and at last it was swept clear into the quieter water beyond. During these exciting moments, the party hung on for their lives; once swept overboard, a man would be lost for ever.

That night they tied up to the bank, probably under the watchful eyes of Chunchos on the other side of the river. The next day the savages suddenly appeared in their canoes, and assailed Maldonado with wild shrieks and a cloud of arrows; but they were such bad marksmen that, notwithstanding the greater mobility of the canoes, the raft got away, nobody being hurt. Probably Maldonado had to use the remnant of his ammunition to effect this remarkable escape.

These Chuncho Indians are of a dirty copper colour, and go about almost naked. Their canoes are burnt out of the solid trunks of trees; and their arrows, which are long and heavy, are usually tipped with *curare*, a deadly

16 Modern Exploration — Stories

poison. At that time the savages were much more daring than they are now, even sweeping through the borders of the forest to outlying coffee plantations or rubber clearings, and murdering the settlers.

Our travellers now found themselves on a broad, deep river, flowing three or four miles an hour, and had they possessed any food, their lot would not have been an unpleasant one. As it was, they were eight starving men, with the whole of the day in which to remember the fact. When (at rare intervals) one or another anxious pair of eyes spotted a banana tree, the raft was piloted to the bank, and the fruit greedily eaten; but apart from this, they had nothing. The days were hot and tiresome, and unrelieved except by the plague of sand-flies—cheerful little insects whose every bite leaves a round blood blister, so that when several flies have bitten on the same spot, a festering sore develops. In the forest were many wild pigs and monkeys; but the unfortunate party had run out of ammunition, and were not skilled enough to catch the beasts in traps.

A few days later they were again attacked by the savages, but fortune favoured them once more, and they got away with only one casualty, Andres Guerra being wounded by an arrow.

Soon afterwards they met some more peaceably inclined Indians. These promptly ran away. Reassured by a few trifling presents, which were placed on the bank while the raft remained out in the stream, they returned, however, and eventually they sold the travellers a canoe. Food, however, was as scarce as ever, and this was the prime need.

They pushed on, the spectre of starvation constantly hovering over them. Two men paddled the canoe, the rest remained on the raft. At last, after travelling five hundred miles by water, they reached the mouth of the

great river Beni, and were at a place that white men had visited before. The Serpent River here was broad and deep, three times as large as the Beni. To the Peruvians its discovery was an event of the highest importance.

Maldonado and his men, however, were by no means at the end of their problems. They had attained their object, but they were now in a densely forested region, far from any habitations, and their hunger remained unappeased. To return home by the way they had come was quite impossible to such a weakened party. Of necessity, therefore, they went on, intending to float down the great Madeira River and into the Amazon proper, where they would be sure to find help.

They had not gone far before they reached a barrier that stretched from shore to shore across the river. This was the well-known and dangerous rapid of the Beni. Around and over the rocks the water surges and boils, furious waves dashing spray many feet into the air, and whirlpools constantly sucking down driftwood and other objects. The big raft could not pass such a spot. They pulled it in to the bank and abandoned it, carrying their canoe and their few remaining effects along the shore to the quieter water farther down.

They were thin, weak, and feverish; while the merciless sun broiled them, and the swarms of insects tormented them continuously. Nevertheless, they did not despair. Obstacles are made to be overcome. Below the rapids another raft was built; and on it the travellers resumed the journey, until, with cries of joy, they sighted the Madeira. Immediately afterwards they were pulled up again by an obstacle which has always impeded navigation there: a string of eighteen rapids in succession, the worst being two miles long, and known as Hell's Cauldron, on account of its evil reputation.

At the Cauldron, into which the hapless party was

18 Modern Exploration — Stories

swept by the current, two streams of water rush along side by side, piling up high against each other in the middle, and sloughing off to the sides in huge treacherous whirlpools; while here and there massive rocks rise out of the foam, and others lie just awash, ready to rip the sides off any craft that is unlucky enough to strike them.

The weary Maldonado did not observe this danger until its avoidance was impossible, but the canoe fortunately had kept close in by the bank, and was drawn up to safety. The raft, swung round by the current, was caught by one edge on a rock; the angry waters tossed it up, and the six occupants were hurled into the cataract. Two of them managed to catch at the rocks, and so hauled themselves out of the water; all the rest, including Maldonado himself, his brother, and the wounded man Guerra, were sucked under and drowned.

When the excitement had subsided, the two men who had struggled ashore—wet and unprotected, without a weapon of any kind, and almost naked—and the two from the canoe, held a sorrowful council on the shore. The raft, battered to pieces, had vanished over the falls. The dead bodies of their four friends lay far out among the raging waters, no one knew where. The hiss of the water and the silence of the forest were equally menacing. It was a terrible moment.

Necessity hardens even the weakest amongst us. The canoe held two men. Four had to be transported. Make another raft they could not, for they had not the means. Accordingly, two were left behind, while the others went on to procure help.

Very soon they came to the isolated house of a Brazilian settler; explained their exploit to the incredulous man; asked for his generous help, and not in vain. First, they were fed themselves; then the other two were brought

in, for in the dreaded forests all men are brothers, excepting only the most barbarous savages.

After recovering from their fatigues, the four survivors resumed their journey. True to their vow, they passed right down the Amazon to Manaos, then a village, but at the present time a large city served by ocean-going steamers. Their adventures ended by the return of the expedition by a different and very roundabout route.

Maldonado's work was distinguished by two outstanding things: firmness of purpose and constancy in adversity. He made no map, and was not even permitted to enjoy the fruits of his success, but his example had broken the spell of secrecy in which the Serpent River had been wrapped, and that example inspired his countrymen to many successful enterprises.

As to the other river, the Beni, we will return to it later; in the meantime, a change of scene may be desirable.

CHAPTER II

Lost in the Deserts of Central Asia

You may fairly say that the South American forest covers only a small part of the Earth after all; that there are other places to which young explorers can go, where the risks are less. Let us see.

From a region that is drenched by rain, buried under plants and swarming with insects, we will jump to the opposite extreme—say, to the vast deserts of Central Asia, where plants cannot grow because of the fierce winds and the drifting sand, where animals cannot live because of the lack of water, and where nobody but an explorer ever dreams of venturing.

The examination of deserts takes place simply because they *are* deserts, and are ordinarily given a wide berth. The majority of travellers, other than those who roam from idle curiosity, are partially or wholly inspired by commercial motives. Countries have to be opened up to trade, minerals discovered, international boundaries fixed. There is something definite to gain by the exploration. All that one gains by examining a desert is “kudos”, and a very burnt complexion.

Nevertheless this kind of work is constantly being done. Love of science, or of adventure, or of the two combined, are lures which prove irresistible to some men, driving them into lonely places, where they will gladly spend years in self-imposed exile. Nor are their labours wasted. It is a noble trait in human nature to

want to know everything about the Earth, and the sum of knowledge is made up very largely by the contributions of such men as these.

Many scientific travellers have wandered over the immense region between the Himalayas and Siberia; have crossed the high, cold, and desolate plateau of Tibet, with its biting winds and its innumerable shallow lakes; have struggled through the narrow defiles that serve as passes across the wild, snowclad mountain chains; have shot wild sheep or hunted wild camels on the edge of the desert, and have been driven to exasperation by the cunning delays of the wily Chinaman or the procrastinating Tibetan. Many of them have followed, more or less closely, the old trade route across Asia, covering vast stretches of desert, in carts or on camels, and glad to reach the occasional oases, where fruit ripens as in a hothouse, and melons cost a penny each. Others have gone transversely, mapping their courses for the benefit of future wanderers.

Usually, on such expeditions as this, one's adventures are mostly of a commonplace character; apart from a few wrangles with one's carriers, or a rare encounter with a band of armed robbers, the journey is tedious in the extreme. The long delay in the morning while the camels are being loaded; the slow crawl through the limitless desert, with its stunted bushes and its distant hills; the jangling of the caravan bells; the halts at watering spots; the encampment at night, all follow one another day after day, with monotonous regularity.

Sometimes, however, the taking of a new course, or the neglect of a common precaution, may lead to exciting moments. Such a one occurred during the crossing of the Takla Makan Desert by the famous Swedish traveller, Dr. Sven Hedin, in 1895.

He was in the middle of his first long journey, *en*

22 Modern Exploration — Stories

route for Tibet; and was, in fact, separated from that country only by a patch of desert. This desert, the Takla Makan, had on its west side the northward-flowing Yarkand River, and on its east side the Khotan, a tributary of the Yarkand. Between the two streams lay a strip of country 200 miles wide, marked "Unknown". That magical word "Unknown" had burned its way into Sven Hedin's mind; and instead of circumventing the desert by a wide loop along a dried-up watercourse, as everybody else had done, he determined to cross it direct.

It had certain fascinations for an inquiring mind, this Takla Makan Desert. It was rumoured to contain dunes so high, and sand so soft, that nobody *could* cross it, and this is the sort of challenge which appeals with peculiar force to the hardy explorers from Western Europe. Its drifting sands were said to have completely buried seven cities, the relics of a civilization nearly two thousand years old; and in those cities were petrified bodies of people who had perished in some sudden storm, jewels beyond price, and gold in coins and bars, enough to satisfy the cupidity even of a camel driver.

Nevertheless nobody had been there and returned alive. The wandering nomads from the surrounding parts sometimes penetrated thither in search of sudden wealth; occasionally they came back empty-handed, with frightful stories of hardship from thirst, of lost bearings, and attacks by evil spirits; occasionally they never returned at all, leaving their bones to bleach in this ghastly wilderness.

All this, in Dr. Sven Hedin's eyes, formed a very good reason why he should penetrate into the desert. He was already an experienced traveller, who had done much wandering about the desert places of Persia and Turkistan; a couple of hundred miles of dunes, more or less, might

be a formidable obstacle, but could hardly prove an insuperable one.

Accordingly he started forth, in April, 1895, from the old trading centre of Yarkand, with a large caravan. He had eight stout camels, besides sheep, dogs, and fowls, the fowls laying eggs every morning until the water gave out. For attendants, he had his servant, Islam; an aged camel driver, named Mahomed; a wanderer from Yarkand, named Kasim; and another Kasim who, because of his earlier searches for gold, was known as a "desert man", and who acted as guide.

They had been told that a mountain chain ran right across the desert, and as the easiest mode of progression would be to follow its base, they went out of their way to find it. This took nearly a fortnight, during which they passed continuously over a desert covered with low mounds of sand; to avoid the unending ups and downs, a serpentine course was necessitated. They carried tanks of water, but had no difficulty in obtaining, by digging, a brackish liquid which passed by that name.

In this place it was curious to find whole woods of scattered poplar trees, sere and yellow, and buried up to the branches in sand; a few, however, at spots where hidden water lay, were green and thriving. Tamarisk bushes formed almost the only other vegetation, and animal life was conspicuous by its absence.

When at length they came to the mountain, they found that it was quite isolated, and beyond it lay the widespread sandy sea of the desert which they had to cross. The trip, however, afforded Dr. Hedin much pleasure, for in the lakes at the foot of the mountain wild fowl abounded, wild camels and other animals were there, and the oasis acquired a peculiar beauty in his eyes, by contrast with its barren surroundings.

From this point to the Khotan River, according to the

24 Modern Exploration — Stories

desert man, was a four or five days' journey. Sven Hedin thought so, too, after consulting his map. As it was certain that they would find no water in the intervening space, he ordered ten days' supply of the precious liquid to be taken. Unfortunately, he neglected to see that his orders were carried out, and the lazy camel men only loaded up enough for the four days. This occurrence was to cost all of them intense suffering, and some of them their lives.

They left the lakes on April 23rd. A few hours later the bright grass, the poplars, and even the tamarisks had gone; they were in a tangle of yellow dunes, from 80 to 100 feet high, or as tall as a typical London building. As they travelled farther east, the size of these dunes increased, some being almost 200 feet from crest to base, which is equal to the height of a church steeple. The dunes are formed throughout of soft sand, shaped like a crescent, with the horns turned away from the prevailing wind. They slowly travel at the wind's command, the sand being blown over the top and down on the lee side; and it is in this way that they overwhelm trees and even houses. Owing to the course of the wind being mainly that taken by our travellers, the dunes were very steep on the east, and more gently sloping on the west, so that crossing them meant a passage across an interminable succession of small hills, five or six to every mile. The sand, too, was so soft in places that the camels would lose their footing on the treacherous slopes, and roll over and over until they reached the bottom. As far as possible, the party kept to the crests, so as to reduce the number of switchbacks.

From now onwards, not only vegetation, but also every kind of life ceased. There are some deserts in which a few small rat-like mammals, or a spiny lizard, or some other strange animal may be found; but here



E 568

SVEN HEDIN

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all was barren. The camels had neither food nor water, except such as hung upon their backs. Even the wind, which had at first given them a friendly impetus from behind, now died down; and the frightful desert closed around them in all its ugliness. The air was dark with fine dust, blown up by the last storm; this hung over them like a funeral pall, penetrating into ears, throats, and noses. Their eyes, however, were protected by goggles, specially padded.

On the second day after leaving the mountain, Dr. Hedin discovered the shortage of water, but instead of turning back for more, he trusted to the accuracy of his own and the desert man's reckoning, and decided to push on.

The very next day two camels died of thirst, but the caravan, steering by compass, and led by Islam, pushed on. The same night they dug ten feet down for water, but without success. Accordingly, all the remaining water was carefully rationed.

Sven Hedin now took the lead, to make sure that they did not get off the right course. He went on foot, as did the rest, so as to save the camels which were carrying the baggage; but day after day nothing turned up but the same monotonous, barren stretch of dunes.

To make matters worse, the dusty haze gave way to a brilliant blue sky, out of which the sun poured his rays with peculiar ferocity, so that the yellow sand swam before eyes that were throbbing with the glare.

In order to save every drop of water, no more was given to the camels, which had, instead, first their saddles to eat, and then all the bread.

One night a whistling and hissing resounded around the little camp, and in a few moments they were in the grip of a sandstorm. To men in their condition, on short rations of water, the myriads of sharp, glassy

26 Modern Exploration — Stories

grains, passing through clothes, and getting in every crevice of the body where sand could lie, formed a maddening torment. What was more material, all the goods were buried, and had to be dug out next morning, in an atmosphere as thick as a London fog.

It was the sixth morning after the start. To delay in such a place, when the river might be only a few miles off, seemed absurd. Peering at his compass in the gloom, Sven Hedin started off again, followed closely by the rest of his ill-fated caravan, up and down over the terrible dunes, and with a single thought in all their minds—"Water!"

So completely were they involved in this storm, that for anyone to have strayed from the rest for a moment would have been fatal; and as it was, they lost a camel, which stopped, and was seen no more.

Night came without the promised river, or any sign of it. It was clear, now, that desperate measures must be taken. All the goods which he had intended to convey to Tibet were abandoned at this place by Dr. Hedin, excepting only his money and a few absolute necessities.

Day dawned, the seventh of that frightful march; but it brought no relief. Of the two quarts of water that still remained, the bulk was stolen: mad with thirst, the thief temporarily satisfied his own cravings, only to leave the whole party worse off than before. For the last time the camels were fed—with the whole of the butter.

Once again they started. No water. No bushes. Nothing but sand and blazing sunshine to be seen. In desperation the last remaining sheep was killed, and the Asiatics tried to drink its blood, but it proved to be too thick and horrible, even for them. The throats of all grew hard and parched, so that swallowing became practically impossible. They were no longer hungry—that had passed; all that they craved for was water.

Even Sven Hedin's iron will could not resist the impulse to drink something. He gulped down the strong alcohol with which he lit his stove, but it paralysed him. He fell down, and the others went on, and left him there.

He was determined not to die in this manner, yet many an anxious thought must have passed through his mind as the only living things nearby crawled out of sight. After a while he got up, and followed in their tracks; only three miles farther on they had halted. The old camel driver, and the desert man, had abandoned themselves to despair; the camels, too, were weary unto death. The united efforts of Islam, Kasim from Yarkand, and Dr. Hedin were only just adequate to perform the task of pitching the tent. But go on in that merciless heat they could not; and when the tent was up they lay under it, in the still air, suffering dumbly, till nightfall.

At this place Sven Hedin abandoned everything but his instruments, money, and one or two other things still regarded as essential; the most important of all, a spade, he carried to the end. Marvellous though it seems, he had, up to this time, kept constant notes and observations, so strong was the zeal within him; but now his own life hung in the balance, and nothing mattered but to procure water.

In the cool night he led Islam and Kasim by the light of a lantern; the other two would not stir, and probably died near the tent, for they were never seen again. Stumbling blindly into the dunes, and slipping back as the sand gave beneath their feet, they moved so slowly that they had only covered $2\frac{1}{2}$ miles by midnight. Islam gave up here, together with the last camels. The light was left with him, in case he should recover; the other two men pushed on in the darkness.

Morning came, May 2nd, the ninth day of their ordeal. How extremely weak they both were is shown by the

28 Modern Exploration — Stories

miserable distance that they covered. Yet all that Sven Hedin carried, apart from his chronometers, was a tin of lobster, a packet of chocolate, and—characteristically enough—paper and a pencil. Kasim had a spade, two pieces of bread, a sheep's tail, and a piece of coagulated blood.

It was hotter than ever. The sun circled round in a cloudless sky; the heat reflected back from the earth dazzled and maddened them. At last they dug a hole in the sand, stripped off their clothes, and buried themselves in it, hanging the clothes on the spade so as to form some poor shelter from the burning rays.

In the evening they dressed again, and stumbled on, by moonlight, always to the east, for at night it was bitterly cold, and this seems to have revived them. Throughout the night they travelled in this way, and next morning, to their intense relief, Kasim descried a tamarisk bush, the first since they had entered the desert. They staggered there, tore out the juicy leaves of the plant, and ate them like animals, thanking God for His mercy. Undoubtedly this discovery saved their lives.

Under the shade of another tamarisk they rested throughout the day. There were plenty of bushes about, but there was no water. In the evening they came to three poplars, and tried to dig down to the roots, but were too weak to use the spade. Here they lit a fire to guide Islam, should he be still following them.

Morning brought them to another belt of sand, and their hearts began to fail. The whole of the day they remained under cover of a bush, but when night fell once more, Sven Hedin made yet another effort to get to the river. This time he went alone, Kasim having given up hope.

For six hours the Doctor staggered on. At one o'clock in the morning he collapsed beneath a bush, in utter

weakness. After a long while Kasim (who had pulled himself together) struggled up, and they continued their weary search.

May the 5th dawned in hope, for they saw a dark line of shrubs on the horizon. It was the river! After six days without a drop of water, it was wonderful that they were still alive; but they must get down to the river or perish. Yet they were so completely spent, and the sun was so hot, that they were forced to lie among the bushes all day, looking at the "life-line" of vegetation in a kind of coma. Kasim collapsed completely, and lay on his back, motionless; but Dr. Sven Hedin was not yet done for. He could no longer stand, but at even he crawled on all fours, spade in hand, towards the river. When he got there the crowning blow came, for its bed was dry.

His determination, at this crisis, pulled him through. He suspected that pools of water must lie on its farther side; and thither he went, across the wide sandy bed, being by now so exhausted that he was five hours in covering two miles. This fact conveys more eloquently than words to what a state he was reduced. But he was not to be beaten. Suddenly a duck flew in the air, there was the magic splash as it struck water, and in a few moments Sven Hedin found himself beside a fresh, clear pool.

How he drank, and drank, and buried his face and hands in the precious liquid! But he could not linger there, for poor Kasim was dying. Filling his boots with water, the Doctor hurried back, just in time to save his comrade's life; Kasim, however, was too weak to walk.

Leaving him there, Dr. Hedin pushed on alone, for three days and two nights, down the bed of the river, so ravenously hungry that he ate grass and tadpoles, there being nothing else. On May 8th, he met some shepherds, and was saved.

30 Modern Exploration — Stories

Meanwhile the faithful Islam, whose hopes had been raised by the beacon fire, had somehow managed to get down to the water, taking the last two camels with him. By this act of devotion all the Doctor's money, and a few articles of equipment, were saved from that ghastly desert crossing.

Such a terrible experience would suffice to sicken most men of deserts. Not so Sven Hedin. The very name seemed to have a magic for him. Eight months later, after completely refitting his caravan, he successfully attempted the crossing of a much greater desert, and you may be certain that this time he kept a jealous eye upon the water tanks at every halt.

About ten years afterwards, another celebrated traveller, Dr. (now Sir) Aurel Stein, roamed far and wide over the same regions, mainly in search of the ancient towns and their relics. He found many ruins, and brought home an immense collection of objects and records. Few finds were more curious than one which he made in the dry and uninhabited wastes of Tibet. One day he happened to cross one route of Sven Hedin, and he found there a tape measure which had accidentally fallen six years before, and had remained, unnoticed and undamaged, during all that time. It is now in the collection of the Royal Geographical Society.

Besides delving into ancient history, Dr. Stein did a vast amount of map-making, aided by an Indian Government native surveyor, Lal Singh. They carried their work right on to the northern ranges of the mighty Himalayas, in order to link up with previous mapping, but their sufferings were very great, and several times they encountered forty degrees of frost. This, coupled with a biting wind that no furs could keep out, told hardly upon them. Dr. Stein had one foot frost-bitten, and lost all his toes as the result; while the faithful

surveyor afterwards became blind. Such is the price that is paid for the lines which make your maps!

Before we leave this region I must just call your attention to one who stands out prominently among the many intrepid explorers of Tibet, Lieut. (now Sir Frank) Younghusband; the same man who, many years later, triumphed over the opposition and prejudices of the ignorant, fanatical Tibetans, and entered Lhasa, "the Forbidden City", at the head of a British Military Mission.

His first journey to Tibet was undertaken some seven years before Dr. Hedin made his perilous crossing of the Takla Makan Desert. He had been on leave from his regiment and, finding himself at Peking, determined to return overland to the garrison in India.

The long, tedious journey through China, Mongolia and Turkestan afforded few adventures; but upon reaching Tibet he was faced with the problem of crossing the Himalayas. There are several passes, all very high. The best-known, and one of the easiest, is the Karakoram, 18,000 feet above the sea, and it is sufficiently severe for the road on both sides to be littered with the bleaching bones of dead ponies.

To cross by a known route did not appeal to Younghusband, and with the instinct of the true explorer (whose duty it is, above everything else, to make pioneer journeys) he selected a pass that had never been crossed by a white man, the Mustagh.

Do not imagine that this was a road. It was merely a hollow between two mountains, and its lowest point was nearly 19,000 feet high; it was buried in ice (being, in fact, a meeting place of numerous glaciers), and was completely isolated by barren ground from any inhabited territory. Thither Lieut. Younghusband forced his guides and ponies, regardless of the fact that he knew

32 Modern Exploration — Stories

little or nothing about ice travel, and was completely ignorant of what lay on the south, or Indian side, of the pass. The circumstance that robber bands with murderous tendencies infested the region which had first to be passed merely lent spice to the adventure; but, as it happened, these gentry left the little party alone.

The approach to the pass was up mountains and down hillsides so steep that the donkeys and ponies had to be let down with one man hanging on to the bridle and two on to the tail of each animal; there being neither path nor road. They were not even sure of the way. Finally, when they did reach the north side of the pass, the animals' feet were so severely cut by the sharp edges of the ice, that the poor creatures had to be sent back after all, and to cross by the Karakoram.

For himself, Younghusband was determined to get over the Mustagh Pass. His men were willing; some of them, moreover, were adept at the very necessary art of cutting steps in the snow slopes. They advanced over rough ice up to a bed of steep snow, into which they sank knee-deep, the air being so rare at that altitude that they had to pause frequently, panting for breath. Otherwise it was easy until they reached the top.

Imagine their dismay when the Mustagh revealed itself, in all its majesty, as a nearly vertical ice-slope, several hundred feet high! At first sight any descent by normal means seemed out of the question. They noticed, however, that a steep snow-covered slope ran down from the summit for a few yards, and then disappeared into an abyss. If they could cross that slope a perilous way, y rock and ice, *might* be made down to the surface of a glacier far below.

None of them was a mountaineer, in the climbing sense, but to turn back now was nearly as bad as to go on. They determined to risk the slope. At the critical

moment one man's nerve failed, when half-way across, and after holding him there, he was pulled back, and sent round after the animals.

The leader cut steps on the treacherous slope, into which each man carefully trod; the slightest mistake would have meant a short glissade into eternity. When they had all safely reached the rocks, they found themselves very little better placed; but the leader, whose head seems to have been unusually steady, descended to a convenient ledge, and tied one end of a rope there; the "rope" being composed of turbans, scarves, and anything else which could be used for the purpose. Down this rope the others slipped or stumbled, the last man taking it with him, and displaying great dexterity. Another long scramble, and they stood safely at the head of a great glacier—the Mustagh Pass was crossed!

Glacier navigation, however, is particularly dangerous in the Himalayas. The glaciers are often a mile or more wide, and twenty or thirty miles long; and, of course, no habitations exist throughout their length. Ice-bordered pools, a fall into which means certain death by drowning; swift-running rivers six or eight feet deep; sharp-edged little cliffs, sometimes twenty or thirty feet high, of pure ice; and multitudinous crevices, whose mysterious green depths descend for hundreds of feet, and which have to be crossed by quaking snow bridges; these are the commonest features of Himalayan glaciers. The sun glares down pitilessly by day, raising the temperature to 180 degrees or even 190 degrees, so that the traveller's skin peels off, and his lips split. At night, on the other hand, it is bitterly cold. Except in the centre of a glacier, there is always a fear of avalanches crashing down from the polished, nearly vertical walls of the valley.

All these dangers Younghusband and his gallant men negotiated without casualties; for although one of them

34 Modern Exploration — Stories

fell into a crevice, and was not immediately missed, they went back and rescued him.

The crossing of the Mustagh Pass is one of the great feats of mountaineering. It has, I believe, been accomplished only once (or possibly twice) since.

CHAPTER III

Dr. Nansen's Polar Sledge Journey

The wildernesses of the Earth are not confined to forests of impenetrable density and deserts of barren sand. The high peaks which pierce the sky, the formidable glaciers which fill the valleys at their feet, the immense marshes at the mouths of certain rivers such as the Ganges and the Zambesi, the snow caps of the Antarctic and Greenland, and the far-flung belts of drifting oceanic ice: all these, at one time or another, have tempted explorers to risk their lives in enterprises from which nothing but pure science can really gain.

If one were to arrange those uninhabited parts of the world according to the number of attempts that have been made to explore them, I imagine that the Arctic regions would prove an easy favourite. For nearly four hundred and fifty years efforts have been directed to the exploration of this great ocean: by passing eastwards along the coasts of North Russia and Siberia; by passing westwards through the maze of islands north of Canada; by passing northwards along the high coast of Greenland; and by isolated efforts to reach the Pole, only one of which has ever been successful. (In saying this, I take no account of Commander Byrd's successful flight across the Pole.)

Despite the well-known risks and hardships, so numerous have been the polar expeditions that there must be some peculiar fascination about the place; the more so

36 Modern Exploration — Stories

as at least one explorer—Admiral Peary, who discovered the North Pole—returned to those icy realms time after time. What is this charm?

It may lie in the wild loneliness of the region; in the crashing and grinding of the floes against one another, as the movements of the sea beneath its frozen surface heap up pressure ridges twenty or thirty feet high; in the lanes of intensely blue water, showing up alongside the white, pure ice; in the magnificent displays of the aurora, circling the heavens in crowns and streamers of every hue; in the pursuit of bears, or observation of the clumsy but amusing walrus; or in the mere battling with Nature at her wildest, when making atmospheric and other observations which would be child's play in a milder clime. Whatever it may be, it has bitten into no soul more deeply than that of Dr. Fridtjof Nansen, the famous Norwegian.

Having had a thorough sample of what polar work meant, by crossing the bitterly cold ice-buried plateau of Greenland, Nansen determined to explore a large slice of the Arctic Ocean in a way which was unique. During this expedition, he, with one companion, Lieut. Johansen, made the most famous of all sledge journeys, leaving their comfortable ship, wandering over the surface of the frozen sea for many months, and finally spending a whole winter there, entirely on their own resources.

Nansen's polar expedition, in fact, shows us *all* the qualities which a good explorer should possess: foresight in planning, minute attention to detail, scientific ability, dauntless courage, extraordinary resourcefulness, and great physical strength. The proper use of them took him 170 miles nearer to the Pole than anyone had ever been before.

A few years earlier a ship—the *Jeannette*—had been wrecked in the Arctic Ocean, north of Bering Straits,



The Arctic Regions

38 Modern Exploration — Stories

and relics from her were afterwards found on the coast of Greenland. Nansen argued from this, that if a ship could be built which would resist the pressure of the ice, she might float across the Pole, frozen fast to the ice, in the same way as the relics had gone.

The idea received financial support, and the *Fram*—built by an Englishman, Colin Archer—came into being. *Fram* means “Forward”, and never was a ship better named; for not only did she safely carry out her original task, rising easily as the ice strove to crush her, but she also carried a second expedition into the island-studded wilderness north of Canada, and then, when nearly twenty years old, took Amundsen south to Antarctica in 1911. Thus the *Fram* has the remarkable distinction of having gone farther north and farther south than any other vessel.

The experts explained to Nansen, at great length, that if a vessel were lying in a lane in the ice, which suddenly closed, the immense pressure of the floes would stave her sides in, no matter how stout the boat, or however ingenious her lines. They also told him that, once frozen fast, the *Fram* would be at the mercy of every attack. They were wrong. Colin Archer designed such a ship that she slipped up, yielding to the pressure, and thereby confounded all the critics.

The expedition was a long one, being intended to last three years. For a considerable time all went well and quietly.

They sailed from Christiania on Midsummer Day, 1893, and, after overcoming various difficulties on the north Russian and Siberian coasts, passed Cape Chelyuskin (the northernmost point of the Old World). Soon afterwards they found an ice-free sea, across which they sailed merrily northwards for a long while; but eventually they were frozen into an ice floe during September.

From that time until August, 1896, the ship drifted steadily to the west, impelled by a current that carried both her and the ice about her. She was finally released, by charges of gunpowder, exactly where Nansen had expected, i.e. near Spitsbergen. Throughout this long time, important scientific observations were made daily.

During the winter of 1894 it became obvious to all on board that the ship would not cross the Pole. Nansen thereupon decided that he, with one companion, must leave the ship, taking sledges and dogs, and travelling northwards as far as they could. Underneath them would lie an ocean about $2\frac{1}{2}$ miles deep; but they would be walking over ice that was from eight to twenty feet thick. It was clear from the start that they would never find the ship again (except, possibly, in Norway), so that they had to be entirely self-supporting. They relied upon reaching land either at Spitsbergen, Franz Josef Land or Nova Zemlya—northerly islands which are mostly buried beneath snow and ice, but from which they might hope to pass over to Europe. Of course they were very elaborately and thoroughly equipped for the journey. They even took lessons from the ship's doctor in setting broken limbs.

On 14th March, 1895, all was ready, and they left the ship, Johansen being the fortunate companion of the leader. One day later the few men who had gone a little way from the ship with them, returned. Their thoughts must have been just a little dubious as the two stout-hearted Vikings and their frail equipment vanished—perhaps for ever—into the unknown north.

There were three sledges, drawn by twenty-three dogs. Nansen had provided for every contingency. He took two Eskimo boats, or *kayaks*, in case they should come to open water; these occupied one sledge. The other two sledges contained their food, sleeping bag, and tent.

40 Modern Exploration — Stories

Rations that were needed promptly were packed in separate parcels, to avoid the long delay of opening larger ones, for in those bitter latitudes the simplest of jobs takes much longer than one would readily credit; fingers are frost-bitten, knots will not come undone, even butter assumes an unfamiliar and bricklike hardness, and must be chopped with an axe. As the ice was rough, everything was securely lashed to the sledges; but, even then, sharp projecting points of ice sometimes ripped open the food bags, causing delay while the precious food—it was in powder form—was scraped up again. To provide for their future needs the explorers carried rifles and ample ammunition; also harpoons, for dealing with possible seals or walrus. Owing to the great weight of fur clothing, they wore only woollen attire. One result of this was that the intense cold froze the perspiration on their clothes during the day, every movement making them crackle like ice armour; while at night the same clothes could only be thawed in the bag, or upon the owner's body, where they lay like wet blankets. As this state of things had to be endured for several months on end, you can imagine what manner of men physically were the tall, strong Nansen and his comrade Johansen.

They marched northward as fast as they could, driving the sledges for nine or ten hours a day, with only a short break for lunch—a bitterly cold halt, due to the biting wind. The morning and evening hot meals were their beacon fires; and with what thankfulness did they crawl into the warm bag to rest at night!

It was intensely cold, the temperature falling at night to -45° F., and once to -49° F., or 81 degrees of frost; such a great degree of cold froze even the mercury in the mercurial thermometer.

Although the first few days' travelling over the ice proved fairly easy, the surface soon became much worse.



THE START FROM THE *FRAM*

By kind permission of Dr. F. Nansen

Instead of the flat ice they had hoped for, they were constantly crossing long lines of hummocks—irregular walls of shattered ice blocks, twenty to thirty feet high, which were formed by floes crushing against one another. Over these rough places both sledges and dogs needed much careful guiding, and there were many spills. Usually Nansen went ahead with the sledge containing the kayaks, to find a way, while Johansen followed with the other two sledges and the dogs. The bitter wind cut through their thin clothes. Their fingers lost all sense of touch, and when, as usually happened several times a day, the dogs' traces became entangled, and the frozen lines had to be untwisted, these extremities were in constant danger of frostbite. Another trial occurred, in the shape of lanes or openings between the floes, which were frozen over by the thinnest of thin ice, and through which, more than once, they nearly fell into the sea.

Finally, they found, by April 4th, that they were not making the progress they ought to have done; the reason being that the ice was moving west, carrying them away from the Pole although they marched due north. Their rate of progress, which had been originally from nine to fourteen miles a day, now dropped to half as much, and was sometimes even less. They were tired out with the incessant hauling of the heavily-laden sledges over the hummocks, the perpetual driving of the dogs, and the constant clambering over the uneven blocks. Nansen tells us, in his graphic way, how they would stumble forward, almost asleep as they marched; and how, when the evening meal was ready, they would fall asleep eating it, and wake to find it spilled over the sleeping bag.

This was working to no end. At last, on 7th April, even Nansen gave it up. They were in Lat. $86^{\circ} 13' N.$, a far higher point than had ever been attained before, and only 226 miles from the Pole itself. Nothing but

42 Modern Exploration — Stories

ice floes and hummocks extended to the north. To reach the nearest land they would have to cover some 400 miles, not a pleasant journey at any time, and, as the spring was coming on, travel would speedily become most difficult on the ice. Accordingly they turned back, reckoning that a month, at the most, would bring them to the northern part of Franz Josef Land. They were hopelessly out in this, for just four months of frightful toil and continual anxiety elapsed before they felt rocks beneath their feet.

On 12th April they were so tired that their chronometers were allowed to run down. The exact time kept by these special watches was the only means they had of ascertaining their longitude; and as at this near spot to the Pole the longitude lines lie within a few miles of one another, the error might have had serious consequences. Fortunately Nansen's reckoning was not greatly out, but from that time until long after he reached land, he always had the anxiety of being uncertain about his true position.

They steered for the land by compass. After a few days, the ice, which had opposed them when going north, now—by a northerly drift—hindered their progress to the south; in this way they were robbed of hard-earned miles. Although they had plenty of food for themselves, there was no means of carrying much for the dogs; stern necessity compelled these poor creatures to be killed, one by one, to provide food for the remainder. As time wore on, too, the dogs gradually became weaker, and more of a hindrance than a help.

By the end of April, Nansen and Johansen found a new obstruction, in the shape of lanes in the ice, lying athwart their course, and, as a rule, far too wide to cross. Long detours were necessitated by this, and many a risky passage was made over thin ice. When all else

failed, the two men had to sit down and wait, more or less patiently, until the wind or current drifted the floes together, and closed the crack. They could not use the Eskimo boats, or kayaks, at this time, because the sharp edges of the ice had torn the canvas fabric, and to halt for repairs would mean much delay, with no guarantee of constant use once the boats were launched. Accordingly they put off this inevitable work until the last instant.

On 19th May, long after they had expected to reach the land, they were still out over the open sea; but here, for the first time, they saw tracks of polar bears, a welcome hint that, if their other food gave out, they could still shoot a meal as occasion arose. Nevertheless, they soon took to strict rationing as a wise precaution.

From now until the beginning of June they endured a spell of most frightful toil. The warm weather, the deeply drifted snow and sludge, the pools of water, and the mists which constantly environed them made life a burden. The surface was so bad that the sledges would not run, and had to be shoved bodily through the worst places, while the dogs were worn out, and useless for pulling.

On 29th May they saw their first bird, a petrel. It must have been like coming out of the desert into an oasis to meet this first harbinger of land. Soon afterwards, however, they came to a complete standstill, utterly exhausted by the constant sludge, the innumerable lanes of open water, and the incessant work. Undaunted, they sat down on the side of a floe, to await the melting which was sure to come; and here they took the opportunity of repairing the torn kayaks. A week passed in this manner, for spare material had to be improvised out of old sacking, and thread had to be carefully husbanded. At the end of that time the temperature had risen so

44 Modern Exploration — Stories

much that—for the first time since the *Fram* was frozen in—it rained.

The snow and sludge, the lanes and the mist, dogged their footsteps when they started off again; the height of summer was approaching, and the position began to look really desperate. Nansen's diary reveals a fear that food might give out, but—characteristically—no other fear; he was quite certain that he would make the land at last. Fortunately, on 22nd June, they saw and killed a seal, but it was so difficult to secure the capture that Johansen's kayak nearly sank, and many of the articles it contained were floated off by the sea, including the invaluable Primus stove. They were retrieved. Two days later another seal was killed; with it passed the spectre of starvation. The ice now became so bad that the two adventurers were forced to camp again, and to remain there until the middle of July. The long wait was enlivened by the shooting of a polar bear and two cubs, which gave them, not only fresh bear meat, but ample fuel in the blubber or fat.

Nansen refused to be disconcerted. Again the torn kayaks were repaired. Again, on 23rd July, an effort was made to get off the dreadful floes, this time successfully, for the very next day they saw distant land. It was not, however, until much more toil and danger had been undergone that the last strip of water was crossed, and they reached the northernmost part of Franz Josef Land. During one of these battles with the ice, Nansen writes:

“Inconceivable toil. We never could go on with it, were it not for the fact that we *must*.”

In those words lies the essence of “winning through”. To set yourself a task, and then to decide that you must complete it, does away with half the labour.

Another day, when the two were still on the ice,

Johansen had a nasty adventure with a polar bear, which came up slyly, and knocked him down. Happily, Nansen was close by, and while Johansen hung on to the bear's throat, Nansen seized his rifle and shot it.

Although the most hazardous part of their journey was ended, there still remained an epic of adventure before the two heroes were to shake another human hand. The place they had reached was an uninhabited island, and owing to their uncertainty as to the longitude, Nansen could not identify it with any known land. He determined to continue southwards, whereupon the toilsome progress was resumed, partly over the ice, and partly in the Eskimo boat.

Eventually, on 15th August, they reached the west coast of Franz Josef Land, being then—although they did not know it—not very far from a British expedition which had established permanent quarters at the southern end of that long, desolate string of islands.

An open sea, blue and sparkling in the sunlight, lay before their eyes, stretching southwards to the homes that they longed for; but, alas! bad luck and worse weather now supervened, and it became obvious that their safest plan was to spend the winter where they were. In this place they were certain to obtain seals, bears, and walrus, provided that they did not delay the chase too long; but to march south meant leaving their potential food supply behind them with no certainty of obtaining any more. Winter, too, was close at hand.

They compromised by going southwards for a short distance, and then, landing again, they prepared to stay the winter there. To shelter them from the strong autumn gales they built a temporary "den" of stones, with coats for the doorway, and their thin tent for the roof. It was so small that the tall Nansen could neither sit upright nor completely recline in it; but it was better

46 Modern Exploration -- Stories

than nothing, and the tent had become practically useless.

In the intervals of hunting bear and walrus they set about making a larger and permanent hut, ten feet long by six feet wide, rising to three feet above the ground, and hollowed out to three feet below. They had no tools but their hands. However, a sledge runner was converted into a pick, and the shoulder-blade of a walrus served as a spade. With this equipment they contrived to build a hut in which they could spend the bitter winter; the temperature inside reaching freezing-point, or thirty to forty degrees warmer than it was outside. Unfortunately a cold snap caused the ground to freeze before the floor could be levelled up, so that they had perforce to lie on the rough stones until their bones ached. A chimney to take away the smoke from the bears' fat oil was built out of snow and ice. Occasionally, it melted, and had to be renewed; but it served its purpose. The roof of the hut was made from a single drifted log of wood, over which were slung the heavy hides of walrus. These hides were frozen so hard that they had to be sunk in the sea to thaw them, and then knocked into shape before they froze again!

Nansen took care to obtain a good store of bears' flesh and walrus blubber; and then, secure in his confidence of ultimate safety, settled down, with Johansen, to endure the dreadful isolation of the long Arctic night.

They remained in the hut for nine weary months, or until the succeeding May. Each took on the cooking for one complete week, and this formed a sort of calendar, which was checked by Nansen's grease-stained diary. Both of them wisely slept away as much of the time as they could; they were, in fact, drifting into the state of primitive children of Nature, and though both grew

unkempt and dirty, neither noticed anything peculiar about the other's appearance.

The chief trouble was the blubber smoke. Besides making their eyes smart, it left a film of grease on everything with which it came into contact. So saturated were their clothes with oil, after a time, that they stuck to the flesh, and upon being pulled away created sores, which needed constant cleaning with antiseptics. Having no soap, they indulged in occasional washes with moss and sand. Despite all this, and the dulling inertia of the place, Nansen's temperature observations went on regularly throughout the winter.

At times foxes paid the hut a visit, stealing the sail of the boat, a thermometer, a ball of twine, and other indigestible trifles. The explorers missed the twine most, for it was their last ball; its loss forced them to devise a substitute by unravelling the thread from the bottoms of bags. The sail, which was even more important, was recovered.

While they were securely, if not exactly snugly ensconced in their low shelter, howling gales swept over it. So furious were these winds that on one occasion a kayak was blown several hundred feet away; and at another time a stout maple stick broke like a straw. Nansen, however, had foreseen these gales and had dug his hut deeply down, and the walrus hides, lapping over the roof almost to the ground, formed a stout protection.

As the spring of 1896 came on, renewed hopes arose. It was determined to get away south as quickly as possible. All this time they had carefully husbanded some of the provisions which they took from the *Fram*; their usual diet, during the winter, being bear broth and bear steaks, and despite its monotony they never tired of it. Having so much meat had actually caused them to put on weight, while the dreaded disease, scurvy (which has wiped out

48 Modern Exploration — Stories

more than one Arctic expedition, and caused much suffering to others) never attacked either of them.

There was so much to be done in the spring that 20th May arrived before they could leave the hut. They then continued southwards. Nearly a month later—on 17th June—Nansen, who had gone on ahead, encountered Mr. Jackson, of the Jackson-Harmsworth expedition. He was immediately recognized, and taken to the Englishman's permanent wooden hut at Cape Flora; Johansen was brought in shortly afterwards, and their troubles were over. Nothing now remained but to await the arrival of a steamer in August, as patiently as they could, and then to make a triumphant return to their homeland.

Yet how near a thing this expedition was to disaster! Many times, when on the ice, the fate of those two brave men hung in the balance; and never was it more nearly sealed than when, only five days before meeting the Englishman, they had their last and most thrilling adventure.

They had been sailing in the kayaks, which were tied together to make one double boat. They had landed on an ice floe for a rest; Nansen having tied up the boat by a rope that he thought was insecure, but Johansen assured him that it was all right.

A few minutes later Johansen called out that the boat was loose. So it was, and drifting rapidly away!

They rushed to the edge of the ice, for everything they possessed—food, clothes, ammunition, rifles, sleeping bag—was on board. Without a moment's hesitation Nansen tore off some of his clothes, took off his watch, and plunged into the icy water. He was a strong swimmer, but the kayaks were drifting away from him, and it seemed to the anxiously watching Johansen as if he would never get up to them. Yet death was certain for both men if the boat were not caught. By a superhuman effort Nansen

did it, but he was numb with cold, and could only hang on half in the air and half in the water. One last struggle and he was aboard. He was so cold, however, that he could barely paddle back to the floe. As soon as he got there, Johansen wrapped him up in everything warm which they possessed, but it was hours before the penetrating effects of the cold immersion wore off.

When Nansen returned to Norway people were astonished to see him, for they had given him up as dead. The news was rapidly flashed all over the country—nay, all over the world: "Nansen has returned!"

Good news, like bad, travels in patches. On the very day on which Nansen landed, his stout ship, the *Fram*, under the skilful leadership of Captain Sverdrup, was brought by blasting out of her icy prison, and a few days later there was a happy reunion of the whole expedition.

CHAPTER IV

Incidents of African Travel

In these days, when the Cape to Cairo Railway looks like becoming an accomplished fact; when even motor-cars can be driven over the same route without any very great difficulties; when, especially, Negroes, Bushmen, Gallas, Arabs, and all the fanatical brown- and black-skinned inhabitants of the Dark Continent are familiar with the white man, and work under his powerful influence, African exploration may appear, to the uninitiated, to be a thing of the past.

This is true, however, only of the pioneer or preliminary work. There are vast areas which have never been properly mapped; and until quite recently there were numerous patches into which it was highly dangerous for a European to venture. This was proved by the murder of the intrepid Boyd Alexander, only two decades ago.

The Great War, which imposed on British and German colonial troops the need of marches and counter-marches over wide regions, did much to clear away obscurity from such colonies as the Cameruns and German (now British) East Africa. Many trips by aeroplane, too, have made remote parts of Africa so familiar that one is tempted to think how much is known about this great land, instead of what remains still to be learned.

It is indeed difficult for us to realize how extraordinarily great were the obstacles with which the older African explorers had to contend: hordes of greedy and warlike savages, gathered into many tribes, which were

hostile to one another in everything except the desire to harass the white invader; an absolute lack of roads; long stretches of barren desert, of dense forest, and of undrained marshes; unclean air, sleeping sickness, and a whole string of virulent fevers.

Pictures rise in one's mind of Livingstone patiently working his way up the Zambesi, passed on from chief to chief, and carrying the gospel of goodness and self-restraint into the most savage hearts and the most frightful barbarism; of Stanley, boldly sailing down the broad and shallow Congo, straight into the midst of a fleet of enemy canoes, and answering their flights of poisoned arrows with a hail of bullets; of Mungo Park, his trials almost ended, embarking on the black flood of the Niger only to be drowned in it; of Du Chaillu, the picturesque hunter of gorillas and companion of headhunters in the Cameruns; of Burton, Speke and Grant, lying at death's door with fever, yet carrying on their pioneer journeys despite illness, opposition, robbery, desertion, and everything; of the lion-hearted Selous, king of all big-game hunters, who, after meeting every peril that Africa had to offer, died, as an old man, by a German bullet in the Great War; and of many another brave and able man whose name is graven in the book of African discovery.

Yielding in place to none of these was Joseph Thomson, who made five different expeditions into Africa at a time of great danger, and whose name would have been better known—though it could not have been more illustrious—had he not died when in the thirties. It was his proud boast that he never, even under the greatest provocation, had to resort to force. His motto, "He who goes gently goes safe; he who goes safe goes far", was ever in his mind. He was, besides, peculiarly adept at keeping his own counsel, and not alarming his rascally followers until it was too late for them to run away.

52 Modern Exploration — Stories

Of all his expeditions, perhaps the most venturesome was the fifth; when, in 1889, he penetrated into southern Morocco. At that time, as at present, this region was a hotbed of Mahomedan fanaticism; bloodthirsty and unwashed followers of the Prophet were ever eager to slay the Christian dog who pried into their country, and interfered with their trade in slaves. The great chain of the Atlas Mountains—the north African “Alps”—was practically unknown because of this hostility, when Thomson, despite an express prohibition from the Sultan of Morocco, and the constant opposition of treacherous carriers, determined to clear up some of the mountain geography. In ascending the mountains he was shot at by the Moors who lived beneath their shade, but he took good care that their pursuit of him led him *uphill*, thereby achieving his purpose of attaining the heights—even out of a retreat he was ready to derive advantages. Later, in Morocco city, he had the misfortune to attract attention during a Moorish festival, and he and his one English companion, Mr. Crichton-Browne, were severely stoned barely escaping with their lives from the frenzied mob.

The third expedition of Joseph Thomson proved to be the most fruitful in results. In 1883 what is now British East Africa was an almost wholly unknown country. Between the coast town of Mombasa, or the island of Zanzibar, and the great lake Victoria stretched deserts, forests, and rivers that scarcely any white man had seen, except on their northern and southern margins. To remedy this state of affairs the Royal Geographical Society found a large sum of money, with which they sent out Thomson in December, 1882.

His instructions were to examine the country between the coast and the lake, and to find, if practicable, a direct route to the latter. Hence he was necessarily carried right into the heart of the Masai country. Now, at that time,

the Masai were the dominant race in this part of Africa; hardy savages of splendid physique, accustomed to spartan diet, and armed with heavy spears, swords, and knobkerries. For protection they employed large shields made out of buffalo hides. They lived by cattle stealing, and were nomads, roaming from pasture to pasture with their herds and families. On everybody who passed through their country they levied the heaviest of tolls; while fortunate indeed was the caravan which escaped destruction at their hands, if not large enough to defend itself.

For the contemplated journey, therefore, a large and powerful caravan seemed essential, but the mere mention of the word "Masai" caused any prospective carriers who might have been hanging around Zanzibar to disappear in double-quick time. Yet considerable food supplies, trade stores and instruments had to be carried, or the project would have ended within sight of the coast. Reduced to taking whatever men he could find, our traveller was even then six weeks in forming his caravan; and when at last it started, in March, 1883, he had misgivings as he saw his men pass along the track before him. His 120 porters "could only be described as the very offscourings of Zanzibar villainy. They formed one of the most disreputable caravans that ever left the coast." On the other hand, his ten soldiers and three headmen were all splendid fellows.

They were speedily involved in a barren wilderness, where not a tree would grow, and the only water to be found was so foul as to be undrinkable. Struggling across this desert, they entered a tropical forest zone, where, for a brief space, they enjoyed the spectacle of beautiful and stately trees, of cultivated open glades, of rushing waters and peaceful villages. Soon after they arrived near the base of the great peak Kilimanjaro,

54 Modern Exploration — Stories

which rises, finger-like, to a tremendous height above the plains, and, although on the Equator, has a cap of gleaming snow.

This was the border of the Masai country, and it was only by blood-curdling stories of Masai rovers who would cut the throat of any straggler, and even by placing guards on the roads to turn back deserters, that Thomson avoided seeing his caravan vanish like smoke, so eager were the craven and panic-stricken porters to return to Zanzibar.

I pass over the long, toilsome marches, day after day, in the broiling tropical sun; the palavers with suspicious and grasping natives; the constant endeavours to avoid a fight, which might well have ended in the whole caravan being wiped out; the arguing, bullying, and driving which alone had any effect on the cowardly carriers; the insect pests, the improperly cooked food, the comfortless nights, the impure water that conveyed the germs of fever. These things were common to everyone who endeavoured to penetrate into tropical Africa in those days.

Besides all those minor ills, Thomson had to contend with the secret opposition of his treacherous guide, Muhinna, a native whose principal business seemed to be to lead his employer into the worst places, where the native chiefs might drive the hardest bargains before letting the caravan pass. Muhinna, of course, derived from all this a good share of the plunder.

Thus, by the time that the stately peak of Kilimanjaro stood revealed before him, our traveller had to deplore the loss of most of his strings of beads and rolls of cloth—the only barter recognized at that time by the savage blacks.

At this point he met an even more expert plunderer than his guide, one Mandara, a powerful chief, who

robbed him of everything he could take, including even his gun. It was not called robbery, but merely "receiving presents", but it was robbery just the same. However, Thomson was then engaged in dodging a powerful force of the Masai, and probably he philosophically regarded Mandara as the lesser of two evils.

The methods of these native chieftains—who were really little better than unclothed brigands—were uniformly the same. They greeted one as a brother. They accepted one's first gifts with pleasure, one's second gifts with complacency, and one's subsequent "presents" with mild disdain. They were invariably anxious that the rich white prize—whose person and tent were entirely at their disposal, so little did they understand the idea of privacy—should remain with them as long as possible, or at any rate, until the magical iron boxes, with their bright beads, their cloths, knives, cheap watches, and so forth, were completely emptied. Hence, every pretext which a quick but wandering intelligence could devise was employed to delay the departure of the visitor. Murderous thieves were always on the trail within a single hour's march beyond the boundary of that particular chief's domain. Either there was no water to be found, or else the country in front was an impassable swamp; in either event, fever and the tsetse fly would speedily destroy the entire caravan. And so on, and so on. More than once, when dealing with these gentry, Thomson found (like many another traveller before him) that the only way to get rid of them was to take French leave, and by a forced night march to put a good span of miles between himself and his leech-like "friends" ere morning came.

After escaping from the clutches of Mandara, the expedition crossed the route of a German traveller, Dr. Fischer; a route, unhappily, that was stained with blood,

56 Modern Exploration — Stories

as he had been forced to fire upon Masai raiders only a few days before. The whole country was in a blaze of excitement, and the prospect before the solitary white man, with his scarecrow caravan of dusky cowardice, was far from bright. Nevertheless, he was not the sort of individual who turns back before he must; so he entered the Masai territory, and passed through one of their villages. Here the savages crowded round him in great excitement; one of them raised his spear threateningly, and Thomson was very nearly killed. Even now his self-control prevented bloodshed. But although he maintained a firm front, smiling at the scowls and threats of the Masai, he noticed that the blacks were flocking towards his caravan, obviously with the darkest designs. He was far too clever to be caught in a trap. Hastily packing up at night, and aided by a heavy rainstorm, he led his men through the Masai village again, and into a land that was comparatively safe.

This experience made it clear that he would never get through to the great lake with his present meagre resources. Leaving his caravan in charge of the headman, and taking only a few of the best porters, he hastened back to Mombasa for fresh supplies of trade goods, and for new men. Thus, five months after the start, and after undergoing all sorts of hardships, he was no nearer to his objective.

During his stay in Mombasa he learned for certain—what before he had only suspected—that his guide Muhinna had systematically tried to wreck his projects on every possible occasion; but as there were no other volunteers for the difficult post of guide, he was forced to endure the presence of this man, and to receive his lies and trickery with smiles, at the same time as he was wondering what mischief the fellow would be up to next.



BOYD ALEXANDER

From a painting by H. Daniel based on a photograph taken by : Belgian officer in the Congo in 1906, when the explorer was nearing the end of his journey from the Niger to the Nile. Reproduced by kind permission of Herbert Alexander, R.P.C., R.W.C , F.R.G.S.

They returned to the caravan in July, and made a fresh start for the Masai country. This time they were more fortunate, having linked up forces with a much larger caravan which was also bound for the interior; yet even then the united body had a difficult and perilous passage.

In particular, they experienced a taste of savage Africa at its worst; being attacked by several rhinoceroses, who charged madly into the caravan, and at once threw everything into disorder. Donkeys bolted, porters shinned up trees, and the unfortunate leader, as often as not, found himself alone to face the ugly and infuriated beasts. It is most difficult to kill a rhinoceros, unless you hit him where his armour-like hide is creased, as behind the neck; and on one occasion Thomson stopped the two tons of moving fury only with his last cartridge, and when it was within about eight feet of him. Wild buffaloes, also, took a fancy to that caravan. These are, perhaps, the most dangerous of all wild animals, if allowed to get too close. One of them tossed a donkey high in the air, nearly killed two porters, and was only stopped by a bullet.

The long winding caravan subsequently passed across a desolate and eerie desert, white with salt; here they noticed the noble giraffe, as well as large herds of wild-beeste and zebras.

Soon afterwards they reached the camps of the Masai, who wandered around the caravan as if they owned it, stole whatever they took a fancy to, and treated the travellers—white and coloured alike—with the utmost haughtiness. Everything had to be locked up from their thieving fingers, and every day's camp had to be encircled by a triple fence of strong thorns. As night fell, however, the savages withdrew; guards were mounted at the fence; the travellers slept the sleep of exhaustion; and

58 Modern Exploration — Stories

the nightly concert of howling hyenas, roaring lions, and other prowlers of the jungle began. It was a strange life. Surrounded by savages and wild beasts, our traveller was like a man with a lighted match looking in a petrol can. Nothing serious happened, however, and the caravan eventually passed into the territory of another tribe, the Wa-Kikuyu, who were less warlike although greater thieves.

On their first night among these people a collision occurred, in which two men belonging to the associated caravan and several of the enemy were killed. This fight might have had serious consequences, had not Thomson, true to his motto, kept his own people out of mischief, and patched up a peace between the other caravan and the Wa-Kikuyu; a task which was not to be envied, if one remembers all the excited, weak-kneed porters, gibbering aimlessly, firing at shadows, boasting of what they would do if the other side only ran away, and generally displaying an utter lack of self-restraint.

The very next night the expedition had an even worse experience. The caravan was suddenly attacked by lions, which pulled down and killed several of the donkeys. The other donkeys bolted. The loads were scattered everywhere in confusion. The cattle of the caravan stampeded into the jungle. Some men clambered up trees to safety, others shot at any moving object, and thereby hit their own braying donkeys; others ran hither and thither, in the utmost terror. The pandemonium ceased only with the arrival of dawn, while it took three whole days to clear up the mess, and to recover the scattered goods.

Throughout these exciting days our traveller had his routine jobs to do, in wet weather or in fine, in desert or in jungle alike. His map grew with his journey, and he spread its bounds by making side trips to hills, or even up mountains, at every favourable opportunity.

One of these trips was made when they reached the small but beautiful lake Naivasha, the blue waters of which are surrounded by a curious volcanic country, with sugar-loaf cones and steaming hot springs. The lake was also surrounded, at that time, by the Masai. By now, however, Thomson had become sufficiently familiar with the ways of those freebooters to dare a trip into their most sacred haunts, under the shadow of the giant Mt. Kenya. Like Kilimanjaro, this is a peak which rises, vast and solitary, out of a plain into the realms of perpetual snow. The ground at its foot was a favourite Masai cattle district, but Thomson had not been there long when a frightful epidemic broke out amongst the cattle. Animals dropped by hundreds; the air was foul with the stench from their putrid carcasses, and nothing but diseased meat could be procured. Moreover, his trade goods gave out, all he had with which to satisfy his Masai friends' rapacity was "a couple of artificial teeth and some Eno's Fruit Salt".

Fortunately our traveller got away from this fever-ridden spot without accident, and into a good game country, whence he made his way to another beautiful little sheet of water, Lake Baringo.

From here to his last objective, the Victoria Nyanza, there was a march to be reckoned rather by its perilous nature than by its length. It led through a desert, and even the crafty Muhinna displayed his hidden cowardice at this point, and was (probably gladly) allowed to stay behind. Three caravans which had recently made the crossing, had each lost as many men as Thomson possessed in his whole muster, but he was undismayed, and he pushed through the dreaded region with surprising ease. At last the shores of the great lake, which he had striven so long to reach, lay before him. He was now in the land of Kavirondo, a race more cultured than most

60 Modern Exploration — Stories

of the African savages, industrious, and possessing food in plenty.

His next proceeding was dictated by circumstances. Had he possessed enough trade goods, he might have made his way home down the Nile; but he did not feel that his resources were strong enough for this. Accordingly he was forced to return to the east coast, but he took a different and more northerly route, passing beneath the curious Mt. Elgon, a peak that has many cliff dwellings or caves, wherein whole villages of people dwell with their cattle.

His good fortune had now departed. Fever attacked him, and he had only just recovered when, on the last day of the year, he was tossed by a bull. He had put six shots into the animal, and advanced, thinking to see it drop; instead, it charged forward, and gored him, and would probably have killed him, had not one of his headmen shot it dead.

He was so badly injured in this encounter that for almost a whole month he had to be carried in a hammock; his wounds were irritated by the constant jolting, and lacked proper attention. Nevertheless he pushed on eastwards, and reached the dangerous Masai country once more; and now, to crown his misfortunes, Thomson went down with dysentery, a horrible disease caused by unclean water. He was held on to his donkey as far as Lake Naivasha, where he collapsed altogether, and had to stop. For two months he stayed there, hovering between life and death, and during all that time the only food he could get was soup, made for him from the diseased meat of the Masai cattle. "Owing to the wet and bitter cold, I was compelled to shut myself up in a dark grass hut, without fire or light, and I could not drag myself even to the door."

At last, seeing that he got no better, and thinking that

he might as well die on the road as in the hut, he had a hammock rigged up, and set out once more for the coast. No sooner had he left that pestilential spot than he began to revive. He continued to improve, and finally, weak and thin but triumphant, he brought his caravan down to the sea, having nobly justified his own motto by neither losing a friend nor killing an enemy.

Twenty years pass: years during which the pioneer has been succeeded by the roadmaker, the colonist and the administrator. It is the last day of March, 1904. A lieutenant of the Rifle Brigade, with four other white men and a few carriers, has just left Lokoja, on the broad expanse of the lower Niger. The two steel boats and five canoes of the expedition are bound merely for a port higher up the river. And yet, on that day, the first step has been taken in a new chapter of African exploration, not one whit less adventurous or exciting than its nineteenth-century predecessors!

The leader of the expedition was Lieut. Boyd Alexander, Rifle Brigade; the other white men were his brother, Captain Claud Alexander, Captain G. B. Gosling, Mr. P. A. Talbot, and a Portuguese collector of natural history specimens, Jose Lopes. They were bound from the Niger to the Nile, not a very hard task by the ordinary routes, but extraordinarily difficult by the route they had chosen, which was almost wholly along rivers and through countries that were practically unknown. Of the five white men engaged in this expedition two died before its close, and a third—the leader—was killed by natives in the same wild regions, only a few years later. So much for the improvement in African exploration during twenty years!

At first the party worked in sections. The principal detachment, led by Talbot and Claud Alexander, made

62 Modern Exploration — Stories

an extensive survey in Northern Nigeria, in the intervals of constant bouts of fever. One of the strangest places they entered was the Kerri Kerri country, a region where large flat-topped chalk hills rise from the plain like huge pencil ends; each of these natural fortresses contained a village, complete with granaries and water supply, and was practically impregnable.

They gradually worked east and north towards Lake Chad, that mysterious sheet of water on the Nigerian border which has always proved such a magnet to travellers; but before their survey was completed the first victim had been claimed. Claud Alexander, after working constantly up to his middle in mud and water, collapsed with fever, but was summoned to settle an important point, some distance away. His duty to the expedition over-weighed his illness. Rising from his bed, he made the journey, and thereby brought on a fresh collapse; as a result, six weeks later, he died.

This was a tragic blow, but the work had to go on. Gosling went in search of game; Lopes brought up the stores, and Boyd Alexander traced a devious route to the lake, collecting and observing *en route*. He passed through places where the natives, as they harmlessly tilled the soil, were liable to be raided by head-hunters from the hills, and to have their skulls added to the collection. He then crossed a hilly district, where savages "squatted like monkeys basking in the sun", in the intervals of collecting heads to hang in their mud huts. Afterwards he crossed a waterless desert to a rendezvous near the lake, named Yo.

They now moved up to the western shore of the lake. Their aim was to reach the mouth of the Shari River, on the opposite or south-east shore; and meantime large areas of the lake were mapped, under circumstances of much difficulty. Chad is an extremely shallow saucer-

like lake; for miles and miles nothing but reeds and tall grass rise out of the marshes, and the water over a vast area is only two or three feet deep. Four times in succession did Boyd Alexander try to cut a way across, through these reeds, working, often waist-deep, in thick black mud; tormented, especially at night, by countless thousands of mosquitoes, and so short of rations that, at one time, his party was forced to live on rats. Many reedy islands rise out of the lake, and in these a peculiar race, the Buduma, make their homes. For the main part they are industrious people, fishing, and collecting the mineral potash. They navigate the lake in long, peculiar canoes, with square bows and a pointed stern, the frame of each canoe being made of bundles of long reeds tied together, and so cleverly worked as to be watertight. The islands, besides affording rich pasture for their cattle, contain the huts of these people; they are made of matting, plastered over with mud, and so securely closed that the pest of the region—the mosquito—cannot get inside when the entrance is closed.

The unhappy expedition got the full benefit of these mosquitoes; and when among the reeds, and forced to spend a night on the lake, the men would go overboard, and stay all night up to their necks in the water, rather than endure the torment.

While he was at Yo, Boyd Alexander had to go to the aid of a great caravan bound for Mecca, which had been set upon by raiding horsemen. Aided by a lawless native tribe, who poured showers of poisoned arrows upon the pilgrims, these robbers maintained a running fight with the caravan for days, and eventually shut it in at a village, though it numbered seven hundred people and nearly a thousand cattle. Into this small war Boyd Alexander threw himself, and was fortunate enough to see the

64 Modern Exploration — Stories

enemy driven off, and the pilgrims resume their march triumphantly.

Leaving Lake Chad at last, the expedition travelled up the Shari River, and then along a large tributary of the Congo, the Welle-Ubangi, often sailing for days without encountering a soul, at other times involved in arguments and explanations with crowds of curious negroes. This was a country, par excellence, for big game. Wild elephants were often quite close to them; many kinds of deer and antelope; the swift giraffe and the swifter ostrich abounded; while "troops of baboons followed us along the banks, gazing in excited wonder at our boats".

Most important of all, they found an exceedingly rare animal, the Okapi, of which rumours had reached Europe for years, but which this party was the first to secure alive. It has somewhat of the outline of a young horse, and is about the same size, but it is naturally allied to several animal types. It is hardly ever seen in the daytime, hiding in the deepest forest, and even when feeding at night, it appears to be constantly on the move. Lopes, the Portuguese collector, trapped one by observing that it always used the same path; he dug a pit into which the Okapi fell.

The earlier stages of the long journey by river to the Nile were easy; the later stages were excessively hard. The shallow water, the succession of rocky rapids, the heat, exposure, and arduous labour told severely upon everyone. In the middle of it Gosling fell ill of black-water fever, the most deadly enemy of African travellers, and, after a short struggle, he died. Talbot having returned home with the map and the collections from Lake Chad, the leader alone now remained, except for the collector; nevertheless, the work went steadily on.

Until they reached the Nile basin, all the river progress was against the stream, and the shallowness of the rivers made the journey one continual haul against the current and the rapids. Sometimes they had other obstacles than rocks to encounter, hippopotami being exceedingly numerous; and once they ran one down and imagined themselves on a rock, until the rock snorted and moved away!

Boyd Alexander displayed all the resourcefulness of the born explorer. The boats were so badly damaged by their rough usage that the seams began to open, so he filled them up with wooden wedges, and then sealed them with melted wax from wild honey.

At the end of his journey, as he was passing down the vast marshland of the Nile near Gondokoro, the marsh natives, or Dinkas, formed a hideous audience, lining the banks, with their naked bodies painted white, and hurling their spears in the air. Eventually, however, he got out of the marshes, and into the Nile proper, took boat to Khartoum, and so terminated a three-years' journey of 5000 miles, through the wildest part of central Africa.

CHAPTER V

Further Adventures on the Amazon

See map on page 11.

We will return to the hot and insect-ridden forests of South America, split up and surrounded by the thousand and one winding tributaries of the mighty Amazon; the home of many little-known barbarous tribes, the El Dorado of the natural history collector and the lover of brilliant butterflies, the grave of enterprise and the abode of slothfulness.

You will remember that we left poor Maldonado at the bottom of the Madeira cataract. During the twenty years which followed that catastrophe, much exploration of the terribly difficult, forest-choked gorges on the eastern slopes of the Andes was carried out by plucky groups of Peruvians and Bolivians, but at a severe cost, involving the total loss of one party, and much suffering to most of the others.

The Serpent River was known. Another problem still remained unsettled: what became of the River Beni? One end descended into the forest from Bolivia, the other, as we have seen, ran into the lower part of the Serpent. It seems incredible that the 250 miles of this fine stream which were unmapped should not have been traversed by someone; yet it was so, such was the dread of the untamed Indians and the general reluctance to venture into the unknown.

Commerce came once more to the aid of discovery, for

rumours spread that most valuable rubber trees grew all along the banks of the Beni. Settlers established camps or clearings at intervals for a considerable distance from the mountains, but there still remained this 250 miles into which no crew dared go. Hardy adventurers, it was said, had pushed boldly out into the wilderness, and had been completely swallowed up by it. The crocodiles were notoriously so voracious—at least on side creeks—that even white men had been forced to return. The savages were much more savage than any others. A peculiarly large serpent, something like a cross between a giant anaconda and a nightmare, specialized in oversetting canoes and in crushing the occupants to death. In short, any and every terrible story centred on the place.

This state of things was remedied in 1880 by the single-handed courage and resourcefulness of an American engineer, Dr. Edwin Heath. He had already spent a long time in Peru, as one of the builders of the famous Oroya Railway, a line which rises, in about 100 miles, from sea-level to the height of Mt. Blanc, by grades so arranged that the engines alternately push and pull the trains up a zigzag track.

Dr. Heath was originally attracted to the Beni by the adventures of his brother, who, three years previously, had tried to ascend it from its mouth, but was forced to turn back on account of a mutiny. He knew of the valuable rubber and coffee lands, and he knew that this stream, if opened up, would be to Bolivia what the Serpent River was to Peru. Accordingly he formed the resolution to go down that river, and to map its course for the benefit of future navigators.

At first he went to a little settlement called Reyes, in the steaming forest, and twelve miles from the Beni; from here carts pushed down to the river bank axle-deep

68 Modern Exploration — Stories

in mud. The characteristics of such places are mosquitoes, flies, and idle or listless people. All three swarmed around the Doctor for eight whole months before he succeeded in getting a crew together. Indeed, so much cold water seems to have been poured upon the enterprise that only a remarkable man would have persisted in it, so hidebound are people by tradition and so influenced by the dread of the unknown.

Eventually eight semi-civilized Indians undertook to accompany him to one of the outlying rubber camps. These South American Indians are taciturn and stolid, good watermen, but not particularly energetic, and apt to get drunk at every opportunity. It is said of them, however—and my own experience, in one case, confirms it—that if they become attached to a man they will do anything for him. So it was with the Doctor, for although most of his crew cried off when their contract was finished, one man—Ildefonso—stuck to him throughout the severe trials of his journey.

Having secured a boat, and loaded her with food, ammunition, and surveying instruments, the little expedition set forth on 6th August, 1880, and eight days of uneventful travelling brought them to a place called Maco, where the Indians would go no farther.

During each day the routine of map-making went on without incident. Angles were taken, and observations of the sun; occasionally they sounded the depth of water, and once or twice measured the breadth of the stream.

Many jaguars were seen—a sure sign that savages were not numerous; for these great spotted cats—the South American tigers—rarely show themselves where they are likely to be hunted.

Once, however, an alarm of "Savages!" was raised by the crew, who, pointing to suspicious columns of smoke

that rose above the trees, crossed more hastily than bravely to the other side of the stream. Nobody was seen, however, and nothing happened.

This river boasted many more sandbanks than the Serpent; it was, besides, the season of low water. Such sandbanks, to the weary man who is cooped up in a canoe, afford a delightful prospect of stretching one's limbs; but they are the haunts of countless poisonous flies, and rarely could Dr. Heath's party have made use of them. For this reason many people swing their boats in the stream, simply tying up to some overhanging bush, and only disembarking when absolutely necessary. Even so, clouds of black and yellow flies make the days a misery, while at night the mosquitoes, carrying malaria, and brooding over the unruffled water, render sleep out of the question. The mosquitoes are extraordinarily persistent, and manage to get inside the finest net; so that, when one awakes from a fitful doze, it is to find several of the little pests lying about, all bloated with one's blood.

Dr. Heath was, at this time, quite well off for food. The boat stopped occasionally, when he made short excursions into the forest and shot a monkey; this, when singed and cooked, made delicious eating, despite its unpleasant resemblance to a baby!

Such meat as was not eaten was kept in the boat, where it proved an irresistible lure to the many alligators, and was constantly stolen by them.

For the next week the Doctor, accompanied only by Ildefonso, had to depend entirely upon the rubber collectors, who transported him downstream from camp to camp. At one such place they met some Pacavara Indians, a semi-civilized tribe, who thrust feathers through their noses to simulate huge moustachios, and wear the eye teeth of alligators as ornaments in their

70 Modern Exploration — Stories

ears. To advance down the river, however, was beyond their furthest thoughts.

At last Dr. Heath procured another boat, with nine Indians for a crew, and two Bolivian companions; but only a couple of days after the start the terror of the prospect before them so far overcame the whole of them that they absolutely refused to go any farther. The Doctor argued, pleaded, and bullied, but to no purpose. He could not continue his survey single-handed, and was forced to return. On 12th September, just over two months after commencing his journey, he found himself back again at Maco, a miserable six days' distance from his starting place! This is the sort of thing that breaks the hearts of ordinary men.

Dr. Heath, however, was by no means an ordinary man. Undaunted by his first failure, he went about asking everyone he met for help in achieving his aim. To while away the idle hours at Maco, he and two other men cut their way, one morning, through the narrow belt of dense forest between the river's brink and the open plain or pampa beyond. So arduous was the work that it took four hours to get through, but only a quarter of an hour to return.

At last his persistence seemed to meet with some reward. A rubber collector promised to lend him a boat which was lying at a distant camp, so once again he set off down the river. Imagine his chagrin on discovering that the "boat" was a mere husk, sunk to the gunwale in mud, and so rotten that he could push his finger through it. However, it was better than nothing, so he had it hauled out, caulked with corn husks, and plastered with mud. After being dried in the sun it was floated and loaded; but now its rim stood just one inch above the water, and if it had not been for constant baling, the whole affair would have sunk.

The faithful Ildefonso and one other hired Indian formed the crew, and in this rickety outfit Dr. Heath actually accomplished what other men, infinitely better equipped, had been afraid to attempt; he descended the Beni.

An anxious and adventurous day passed, largely in efforts to keep afloat. Their determination, however, met with its just reward; for soon they came to another rubber camp, where nails, bark, and ingenuity combined to make the craft more watertight.

When the Doctor passed the home of the Pacavara Indians, they—perceiving that the boat still had but a couple of inches above the water, and having their minds full of terror concerning the cannibals lower down—chanted “Death! Death!” as he left them. To complete this encouraging send-off, they put on mourning for a month, because they believed that he had gone to a certain death.

In reality he remained very much alive. Ildefonso collapsed with fever, and had to stop paddling, which caused the little party to encamp for two or three days, while the Doctor tended him.

Being determined to push on, the Doctor took the sick man's paddle at last, while Ildefonso lay in the bottom of the boat. The other Indian proved loyal, despite temptations to return, though probably both he and Ildefonso thought their master mad, to worry about such things as the breadth and depth of a mere river.

Every day, now, it was intensely hot, and on those waterways, mark you, the heat can be really felt. It comes on in waves, which make even strong men gasp for breath; the unruffled surface of the water reflects a sickly glare; one's body is bathed in perspiration, and there is an almost irresistible desire to shut one's eyes and sleep. Wandering swarms of flies, however, make rest impossible.

72 Modern Exploration — Stories

On the 5th of October things looked so bad that the Doctor offered to return, but his men refused the chance, and they paddled on.

When each night the throbbing heat subsided, and the brief twilight supervened, they either tied up to some stout tree, letting the boat drift, or pulled her up to some sandy beach, and while they slept, alligators were busily nosing about their craft, attracted by the smell of monkey meat. Usually some of this had disappeared each morning; this caused delay, since it necessitated a visit to the forest in order to shoot more, and a journey into the forest meant a few stings from ants, or some other of the thousand and one torments which abound there.

The 6th of October was hotter than ever. Not a breath of wind stirred, while the haze lying on the water made the senses swim, and every motion an effort. It became unbearable. Slowly a small patch of cloud, that had appeared in the azure sky, spread until the whole was mantled by a dark grey pall, but even then it remained oppressively hot, men and animals moving about uneasily. Making the boat secure, and taking what slight shelter they could, the three travellers awaited the coming of the storm in anxious silence. There was a whistle of wind, a moaning as of a myriad giants in pain, and the tree tops began to rock. Then, without further warning, a furious rush of air burst upon them, and they were in the grip of a hurricane. It howled down any other noise. It beat the water furiously against the shore, tearing away the loose soil, and causing whole slices, trees and all, to subside into the river. Torrents of rain accompanied it, but could not stay its force. It tore up mighty trees from their far-flung roots, and hurled them bodily against one another and the forest, as if they had been but walking sticks.

Then it ceased as suddenly as it had come. The sky



IN THE UPPER IFATH RIVER

From a photograph taken by Col. Foweraker. Reproduced by kind permission of Mrs. F. weert and The Royal Geographical Society

remained dark and threatening, but the air was cooler, and the clouds of steam arising from the sodden plants did not spread far across the river. The travellers, pushing their boat out once more, after tipping the rainwater out of it, resumed their journey, and all things became as they had been before.

The Doctor passed his previous farthest, and henceforth kept a strict watch for hostile Indians, whose presence had hitherto been more rumoured than real. For safety's sake the expedition camped that night upon an island in mid-stream, for it was preferable to be eaten by mosquitoes than to be cut up by savages.

The next day they reached the junction of the Serpent River, which, as I have already said, was a much wider stream than the Beni, and was, moreover, forty feet deep. Their object was attained, and they were now following in the trail of Maldonado. Like that traveller, however, they were to learn that to get there was one thing, but to return, another.

They encountered now many alligators, which showed no fear of them, but lay on the sandbanks, watching them with their wicked little eyes, or, with jaws agape, simulated sleep. In order to keep them away from his monkey meat the Doctor slept with it beneath his pillow; notwithstanding, an alligator came right up one night and tugged it away from beneath the sleeping man. Awaking in alarm, the Doctor turned to find a jaguar, only a few feet distant, digging up turtle's eggs from the sand. However alarming, these incidents showed how extremely rarely any human being wandered there.

The great river was now a mile wide, and running from three to five miles an hour. Their rapid progress was soon retarded though—this time by the Beni cataract, the same at which Maldonado had been forced to abandon his first raft. The river was only partially full, and the

74 Modern Exploration — Stories

rocks ran across from bank to bank; wherefore Heath and his men searched for a way through the tangled forest to the foot of the rapid. But so dense was the vegetation that not an opening of any kind could be found, nor could they cut a way through, having only a single knife. They solved the difficulty by unloading the boat and lowering her over the shallowest point, and even then it was so rough beneath the fall that all three had to hang on or the boat would have sunk. This delicate task took them seven hours, and when it was loaded again the boat was nearly full of water. To make matters worse, they had barely cleared the rapids when night fell with the usual tropical swiftiness; there was no proper camping-ground near, so that the two Indians had to sleep on a ledge of rock which was barely wide enough for one of them, while the Doctor alternately baled out the boat and wrote up his notes. So badly was the old craft damaged by its rough usage in the rapids, that he was compelled to do this or she would have been swamped.

Their affairs were now growing worse. Food had given out, and the business of passing the rapids had diverted their attention from the fact; that morning they went breakfastless. A few hours later, however, they came to country with which the Doctor was familiar, and a welcome banana patch provided them with food. They were safe.

They had now to decide what to do next. To return up the Beni, in that leaky boat, seemed hopeless. There was a roundabout way up the large tributary stream, the Mamoré, to the town of Exaltacion, 325 miles off, and this, unluckily, they decided upon, for it turned out to be infinitely more difficult than the Beni would have been.

Maldonado had passed the mouth of this tributary on

his descent; if Dr. Heath had done the same he would probably have met with the same fate, so much hangs on the decision of a moment.

All they had to eat on their return journey was dried plantain, worm-eaten yucca, and whatever game they could shoot. To provide against accidents, the Doctor wrote an account of his exploit, which he placed conspicuously in an empty shelter, then he set out on his long and fatiguing return journey.

The Mamoré is a shallow river, full of rapids and waterfalls, every one of which meant much anxiety and danger to the little boat. At one such, indeed, she sank, and they had to swim for their lives; all their bananas, rubber clothing, and—most important of all—their only knife were thrown overboard.

“Our food,” says Dr. Heath, “which was sewed up in a hide, and our paddles, were carried to the centre of an immense whirlpool, and were saved by swimming to them and pushing them out.” One paddle, however, disappeared for good; so he replaced it, with characteristic resourcefulness, by burning down a suitable stick with fire and shaping it with a stone. This unlucky day was 13th October.

Four days after, that unspeakable boat, retrieved from the rapids, went once more to the bottom; fortunately it was tied up at the time, and the few remaining contents were saved. Once more these amphibian travellers dived down into the mud, and fished up their craft; once more they turned her over, emptied her, and resumed their journey. However, it was only by the greatest care, and by sitting on the most leaky places in the bottom, that they made any progress.

Three whole weeks passed in this manner before they reached safety, during the whole of which time they were never quite out of the water. Nothing but the

76 Modern Exploration — Stories

necessity of doing it or perishing would have got them through.

As it was, Dr. Heath's return to Reyes, five months after he had left the little settlement, was greeted with public rejoicings. He was hailed as a benefactor, and his accounts of the wild rubber groves—one alone, on the Beni, covered a space of five square miles and contained 10,000 trees—gave such an impetus to commerce that the number of collectors increased fourfold. Most important of all was the completion of Maldonado's work, by opening the combined Beni and Serpent streams to the light of civilization.

Exploration of the Amazon wilds has been carried on right down to the present day, and it is still very far from complete. In recent years Dr. Hamilton Rice, aided by all the appliances of modern science—a wireless outfit, a motor-launch, and a hydroplane—has done a great deal to trace out the waterways in the very difficult region between the vast Negro tributary of the Amazon and the Orinoco. Many Englishmen have also identified themselves with unravelling the geographical tangles of Amazonian forests; in older times these included Spruce, Wallace (the co-discoverer with Darwin of the evolution theory), and Bates, the indefatigable collector of insects. In recent times the most outstanding figure, perhaps, is Colonel P. H. Fawcett, and we can well talk about him, because his history shows one of the practical uses to which a love of exploration can be put. Moreover, his name should be particularly interesting to you, because, in 1925, he set out on an extensive exploration of the upper Amazon, accompanied only by his son and one other Englishman. Strange rumours were circulated about his fate. His continued absence aroused amongst his friends the fear that he and his party had succumbed

either to the savage inhabitants or to the fevers and hardships of the dense forests. These fears were at last substantiated by Mr. George Dyott in the course of an investigatory expedition.

Colonel Fawcett possessed all the best qualities required for forest exploration: a liking for the work, immunity from fever, dauntless courage, and influence over the savages. His work also demanded the greatest tact, besides a strong sense of humour.

When, in the early part of the last century, the various South American states had acquired their independence at the expense of Spain, their boundaries were often defined in the most arbitrary way. Straight lines were drawn from one point to another, regardless of the natural features; and so long as nobody belonging to either side entered the wastes where these lines ran no harm was done. When, however, it was realized that certain rivers had on their banks valuable growths of rubber, or in their beds valuable deposits of gold, then every state whose boundaries ran along or near to those rivers claimed the land.

Englishmen being famous all over the world for their justice in defining boundaries and in settling boundary disputes, Colonel (then Captain) Fawcett was chosen as one of the Bolivian Boundary Commissioners, and it was in tracing out these lines (which run so readily across maps but are so difficult to mark on the ground) that most of his adventures occurred.

I am not going to take you through that silent and monotonous forest again. It is still practically the same as it was when Maldonado entered it, as it has been for countless hundreds of years, and as it will be for many centuries to come. Even the latest "roads" are mostly mere mule tracks. The savages are still untamed, and probably their roving life and innate treachery will

78 Modern Exploration — Stories

always make them a menace until, by the slow advance of civilization, they are wiped out.

But I do want to point out a fine instance of Colonel Fawcett's sang-froid. It was in the summer of 1910, when he had to ascend the River Heath,¹ a small part of the Peruvian-Bolivian boundary line. This is a minor tributary of the Serpent River, rather shallow, and badly obstructed by trunks and branches which have fallen in and which lie as snags on the bottom. At that time it was in precisely the same condition as the lower Beni had been in 1880. A tribe of savages, reputed cannibals—the Guarayo Indians—ruthlessly made war against anyone who ventured more than a day's journey upstream, and several attempts to ascend the river had failed disastrously. An essential part of boundary-making is to map the land, consequently Fawcett had to ascend the Heath with or without the Guarayos' consent.

For the first fifty miles after leaving the Serpent River all went well. Fawcett, who had a profound distrust of local helpers, always believed that a small resolute party of Englishmen could penetrate anywhere and overcome any difficulties. His present expedition comprised six Englishmen and a Bolivian captain. They had three small canoes and plenty of food. Apart from mosquitoes, pium flies, tabano flies, ants, and vampire bats—the latter bit four of the party in one night—nothing happened. Then, in rounding a bend, the leading canoe suddenly came in sight of a brand-new encampment of the savages.

The river here was thirty yards wide. The Indians had built palm huts on a sandbank, where fifteen large canoes and rafts were drawn up. A monkey—a common pet among the savages of the Amazon—was tied up to a post by the huts, but the population, on seeing the in-

¹ So named in honour of Dr. Edwin Heath.

vaders, had taken refuge on a cliff of red earth on the opposite bank, leaving the settlement deserted.

Despite the barking of dogs, the shrieks of women, and the angry shouts of the men, Fawcett boldly steered his canoe up to the sandbank. The savages thereupon vanished—always a bad sign. As the second canoe arrived it was greeted by an arrow shot with such force as to pierce $1\frac{1}{4}$ -inch planks. A shower of similar arrows followed, with a few discharges from old shot-guns, and in the midst of this uproar the third canoe arrived.

Fawcett knew that to return the fire would probably mean his own destruction. He had come prepared with a few words of the Guarayo vocabulary, but neither the words nor his friendly gestures had any effect. He then made one of his men strike up a tune on an accordion, but this had even less effect. Instead, the arrows now came over in such numbers that the settlement looked as if it were planted with them. Each arrow had a barbed point, a shaft seven or eight feet long, and feathers arranged spirally on the shaft so as to keep the flight straight. Such an arrow, aimed at another Englishman on the Upper Parana River, pinned him to the deck of his launch transversely through both arms and his chest.

On this occasion, fortunately, nobody was hit; but though the Guarayos were such poor marksmen they succeeded in killing their own monkey.

Eventually things looked so serious that in order to stop the shooting the Captain advanced into the river, fumbling with the vocabulary and trying again to make himself understood. This action so impressed the enemy by its boldness, that it had the desired effect, the rain of arrows ceased, and after a while the savages helped Fawcett to cross over to their side.

They then surrounded him, and the whole mob dis-

80 Modern Exploration — Stories

appeared into the forest, an even worse hair-raising experience for the Captain than entering the river had been, for on several occasions leaders who have similarly endeavoured to parley with the treacherous Indians have been killed. In particular, a Peruvian officer who attempted to conciliate a party of savages was stabbed to death in a few moments, with thirty wounds.

Fawcett's pluck, however, met with its just reward. A little later, to the intense relief of his friends, he emerged from the forest on the friendliest of terms with the Guarayos and with his own hat on the head of the chief's son.

This extreme coolness in handling savages at a critical moment is a very rare quality, even among explorers, and unless you possess it you had better cut out the Amazon from your itinerary.

CHAPTER VI

Hard Times in Greenland

Many of the names on maps are misnomers, because they give no real idea of the places to which they refer. Of such names, none is more inappropriate than Greenland, that island of almost continental size which lies sprawling to the north of Canada. There is, in fact, nothing green about it, except one or two very tiny patches, while land of any kind, apart from the coast, is as invisible as the green, as it is almost wholly buried beneath a huge ice sheet, thousands of feet thick.

This, you may well imagine, would be a useless place either for explorers or for anyone else to visit. Nevertheless, Eskimos manage to eke out a hard existence there, living in queer communities, with their wonderful canoes or kayaks to fish from, and their teams of dogs to hunt with. To civilize the Eskimos, Danish settlements have been established for a very long time on the inhospitable west coast. As to explorers, the very difficulty of the work acts as a spur to them, for scientific men have always been deeply interested in the huge ice cap, the glaciers and the bare rocky coasts. Consequently a constant stream of expeditions has visited the island for centuries.

Several determined attempts were made to penetrate into the barren interior, but all were unsuccessful, until, in 1888, Dr Nansen—then a young man of twenty-seven—succeeded in crossing from the east coast to the west.

82 Modern Exploration — Stories

This was a very difficult feat, because the east coast, although nearest to Europe, is much more desolate than the west, being bordered by a dense belt of pack ice, through which ships can force a way only during favourable seasons.

A ship dumped Nansen and his men, with two rowing boats, on the floating ice, and left them there. The explorers had so much difficulty in getting to the land, and were drifted so much farther south by the current than they had intended, that the venture seemed hopeless from the start. Nevertheless Nansen at once turned north again, along a narrow lane of water close inshore, went as long as he dared, beached his boats, and pushed boldly uphill towards the interior. Should disaster overtake his party, their ruin would almost certainly have resulted, for there was no settlement to which they could retreat, anywhere on that coast.

At these places, during the brief summer, a wealth of small flowers and a few patches of bright green occur in sheltered places by the shore, Arctic foxes run about, the slow but stately musk-ox raises his head from between his humped shoulders, and the polar bear occasionally wanders inland. The glistening ice is seamed with delicate hues, and with darker patches of blue and green, where hollows or caves occur. But go inland only a little way, and what a difference! The steep slopes end in irregular lakes, frozen over in winter; gaping crevices of great depth and extraordinary complexity bar every yard of the way; and beyond them stretches up nothing but a vast, slightly sloping sea of ice, just like the surface of an ocean turned to stone. There are no plants and no animals of any kind.

This was the pleasant prospect which opened out before Nansen and his men. After getting on the plateau, they had for a long while no great difficulties to encounter,

but the desolation of the place was appalling. The surface of the high plateau, nearly two miles above the sea, was so deeply buried in snow that a staff could not find the bottom; moreover, it snowed nearly every day. He had provided for this, however, all the party being shod with ski, or Norwegian snowshoes; and all were expert in the use of them. They rigged up sails on their sledges, and when the wind was favourable bowled merrily along towards the west coast. At night, when the little encampment slept on the frozen surface, the temperature fell and fell, till sometimes there was more than 70 degrees of frost.

At last they came in sight of the west coast. The crevices here were very dangerous, and there were some narrow escapes; nevertheless, the whole party got safely down to the margin of the sea. They now found themselves in a pretty plight. They were many miles southward of the nearest settlement; food was failing, and, in short, all the elements which usually spell disaster to expeditions of this kind were brewing fast. Nansen solved the difficulty in his usual bold way by tying two sledges together, covering them with canvas, and converting the ski into oars, and in this remarkable boat he braved the perils of a stormy sea, and so reached safety.

Since that famous passage, Greenland has been crossed three times.

For many years no geographer could say whether Greenland was an island, or if not, how far it extended to the north, because the accumulation of sea ice on both sides was so great as to make travel extremely hazardous and difficult. On the west coast, particularly, one expedition after another came to grief, and, unhappily, many brave men lost their lives through the hardships endured in trying to solve this problem. The accounts of adventures with wild animals, especially polar bears,

84 Modern Exploration — Stories

and the curious habits of the wandering Eskimos, which have been written by Kane, Greely, Lockwood, Peary and others, would fill many an evening's talk by themselves.

It was Rear-Admiral Peary who first proved Greenland to be an island. He went up the west coast, made friends with the Eskimos (over whom he acquired an extraordinary influence, so that one of them eventually accompanied him to the North Pole), and advanced gradually but surely by building depôts of provisions; thus his base of operations was constantly pushed farther and farther away. In two great journeys Peary got to the northernmost point of Greenland, but it cost him dear, as his feet became frozen and he had to have eight toes amputated. This was the man who subsequently *twice* went back into the same region, and the second time crossed the frozen ocean to the North Pole.

Up to 1906 one long stretch of coast still remained unknown. It extended from Peary's farthest down the east side of the great island for several hundreds of miles. It was exceedingly difficult to get at, and could only be mapped by men with sledges and dogs, the sea being ice-choked all through the year. Still more difficult was it to say which was mainland and which merely coastal islands, for long fjords indent the mountains, and one had to go to the ends of them in order to prove that they were not straits.

Appropriately enough the mapping of this rough country was undertaken by a party of Danes, under the leadership of Mylius Erichsen. Knowledge of the earth has to be bought even more dearly, at times, than by the loss of toes, as the unhappy story of this expedition shows; yet the leader's work and death afford one more instance of constancy and courage under insuperable difficulties.

The *Danmark*, containing the twenty-eight members of the expedition, left Copenhagen in June, 1906. After battling with the great sprawling ice floes, 140 miles wide, they found a narrow inner channel, up which the *Danmark* steamed to latitude $77\frac{1}{2}^{\circ}$. Here Captain Koch and a party were landed, the ship then turning about, until she found suitable winter quarters farther south. Proper huts were built on shore, and throughout the late autumn, sledge-parties explored the coast and laid depôts to the north. The ground was thus prepared for the next year's advance.

On 28th March, 1907, almost before the long Arctic night had ended, ten sledges, with eight or nine dogs apiece, left the ship, the explorers intending to map the coast until they reached Peary's farthest. They were in two parties. One under Captain Koch went north, the other, under Mylius Erichsen, penetrated into the maze of fjords. The first party completed its task and returned to the ship; the second never returned.

Mylius Erichsen and his two comrades (Brunland, an Eskimo, and Hoeg-Hagen, a Dane) found that what Peary had imagined to be a strait through to the west coast was merely a deep fjord. They named it Danmark Fjord; and the necessity of going back out of this cul-de-sac really cost them their lives.

They met the other party, on its return journey, at the mouth of Danmark Fjord, but owing to the time lost Mylius Erichsen had not finished his work; he therefore decided to stay behind, rather than leave the job uncompleted.

Unhappily they now got entangled in another long fjord, and only found it out when too late. These fjords are like deep channels, with almost vertical walls several thousand feet high, and it is almost impossible to get out of them, except at the two ends.

86 Modern Exploration — Stories

Summer came on and caught the trio unprepared for it. They got into Danmark Fjord again, where they killed a few musk-oxen but could get little else. You will have realized from the story of Nansen's sledge journey how impossible is Arctic travelling in the sludge and soft ice of summer. Mylius Erichsen was now in a similar position; but whereas in Nansen's case the sea always provided him with a seal, a bear, or a walrus just when the prospect looked blackest, poor Mylius Erichsen got practically nothing at all.

With the arrival of autumn cold they made a start across the inland ice to a depôt on Lambert Island on the very day when a relief party left the ship in search of them! They were on very short rations, but they had an even greater evil to face, for their boots were worn out and they had no means of replacing them. They were several hundred miles from the ship, and boots made out of the theodolite case, tied round with string, were a poor kind of footgear on which to cross the ice.

Nevertheless it had to be attempted. On 19th October, just as the sun disappeared, they got up on the plateau with four emaciated dogs and one sledge. Soon food gave out almost entirely. Their feet became frozen. Crawling along over the cruel unyielding ice, with 160 miles to cover before they could reach even the nearest depôt, their fate was sealed. Twenty-seven days of slow—frightfully slow—marching, and Hagen lay down to rise no more. The other two, shaken but resolved to make a last desperate fight, pushed on. Ten days later Mylius Erichsen died; only the Eskimo, Brunland, was left. He, true child of nature that he was, went on with unerring judgment, reached the depôt, ate some of the food, and, being too far gone to benefit by its restorative effect, wrapped himself up in his furs and slept the eternal sleep there.

These brave men did not perish in vain. Their spirit and courage set an example that other young Danes were not slow to follow. Brunland was found by Captain Koch before the ship returned home, but the fate of the others and their records remained obscure.

In 1909 a search expedition, to recover any relics that might exist of the missing men, left Copenhagen under Einar Mikkelsen, who had already had more than one taste of Arctic hardships. It was a thoroughly Danish expedition, comprising only seven men in all, and housed in a 50-ton sloop.

Naturally the expedition covered the same ground as its predecessor, but, being much smaller, double journeys were necessitated to most of the depôts, and the final advance party comprised only two men, Mikkelsen and Iversen. They left the others on 10th April, 1910, having then fuel and provisions for a hundred days, and fifteen dogs. They went on to Danmark Fjord, found the traces of Mylius Erichsen, and started on the return when Mikkelsen fell ill with scurvy, the dreaded enemy of every Arctic adventurer. The weather was mild, and progress slow; finally he became so weak that he had to ride on the sledge. Providentially they came to a string of depôts on the coast, but they contained only tinned food, and fresh meat is essential if one is to combat scurvy. So Iversen set off, day after day, spending sometimes twelve or fourteen hours in shooting one or two rare gulls. They were effective, however, for Mikkelsen recovered. They travelled south, under great difficulties, making only twenty-six miles in ten days, and finding practically nothing to eat except the modest rations in the depôts. At this crisis Iversen became ill, while the three miserable dogs remaining were so weak that they had to be carried on the sledge. Eventually the dogs were eaten as food; depôts were found to be empty, and

88 Modern Exploration — Stories

the two men had a wild race against starvation, in which they only just won, after leaving their tent, sleeping-bags and sledges behind. To crown all, when they got back, after nine months' wanderings, to the little ship, they found she had been wrecked, and a hut built out of her timber; the rest of the party had gone home—taken off by a passing sealer—and they were doomed to spend a winter alone there.

There was, however, food in plenty; they were free for a while at least from the terror of starvation. When the tedious months of darkness had gone, and travelling was possible, they went back and retrieved their abandoned belongings.

They returned to their headquarters, and by shooting musk-oxen provided themselves with fresh meat; but they were doomed to spend another winter alone on that desolate coast. They travelled a long way southwards, even arriving at one point—Bass Rock—only to find that a ship had been there while they were at their old quarters fifteen miles away. She had now gone, and once more the long tedious night of an Arctic winter had to be endured, with its monotonous round of sleeping and eating.

When the third spring came, they made a fresh effort to get away, but were unsuccessful; and there they remained until, on 19th July, 1912, a relief party found them, and carried them home.

These two men, Mikkelsen and Iversen, had thus been through what has probably not happened to any other man: they had spent nearly two and a half years alone in the wildest part of Greenland, dependent entirely upon their own resources and what they could find in the abandoned dépôts.



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ICE GROTTO IN LAT. 70° N.

From a photograph by Lieut. A. Trolle, R.D.N., also a member of the Danish North-East Greenland Expedition led by Nylus Erichsen

CHAPTER VII

In the Wilds of New Guinea

The difference between Greenland and New Guinea is almost as great as the distance between them. Instead of the barren rocks and cold, featureless ice cap, the constant snow and the biting blasts of the former, we meet, in New Guinea, with a riot of vegetation, with trees so thickly crowded that their roots intertwine like the snakes on Medusa's head; with palms, masses of mangroves, sago swamps, and birds like the gorgeous bird of paradise; with bursts of brilliant tropical sunshine, varied by heavy and torrential downpours of rain. Yet even in New Guinea snow is to be found, and many are the pains and penalties that have been endured in efforts made to reach it.

The snow caps the highest summits of the central mountain range which is the backbone of the island. It had been seen from afar many years before anyone made serious attempts to reach it: indeed, although New Guinea was discovered as long ago as 1511, it was not till the end of the nineteenth century that its exploration was seriously commenced. In the 'eighties, Sir William MacGregor, then Governor of the British part of the island, fought his way through the forest and over the hills to the central range, but in Dutch New Guinea, where the snow lies, a similar feat was not accomplished until 1909.

The obstacles to exploration in this wonderful region

90 Modern Exploration — Stories

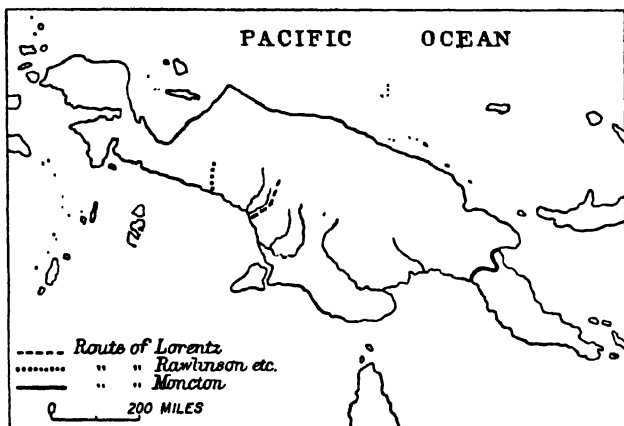
have always lain in three things: impassable forests, extremely dangerous rivers, and an almost complete lack of food supplies (except in the plains, where sago grows). The savage inhabitants, unlike those of South America, are not generally very hostile; most of the Papuans being too greedy and curious to fight the white man, although they are peculiarly apt to fight—and even to eat—each other. The plagues of insects, too, which spoil the pleasure of a journey on the Amazon, are here narrowed down mainly to mosquitoes. One scourge peculiar to the place, however, is the leech; myriads of these swarm in the forests, and, getting a firm hold upon the traveller's legs, make themselves a continual nuisance.

The greatest obstacle to reaching the snows is the forest. So dense is it, even at considerable heights above the sea, that every yard of the way must be cut; and it is not bush, but stout trees, so that the path, even when finished, is frightfully uneven, and will cut to pieces the unprotected feet of native carriers. On the wide low southern plain, which is floored with mud, and partially inundated at high tide, large areas of the forest are quite impassable; forests of mangroves raise their muddy roots out of the water; and, except on the dark waters of the rivers, no man can say without a compass where he is, or whither he is bound.

All food has to be carried by the traveller, for, except in the coastal plain, the forest yields nothing beyond an occasional wild pig. The plains contain large sago swamps; the product derived from these, together with small plantations of yams or sweet potatoes, forms the staple food of the inhabitants.

If the traveller, by dint of furious exertions, has cut his way across the plain towards the snow-clad summits, he finds at the end that his task has scarcely begun. Between the snows and himself there lie perhaps a dozen

knife-backed ridges, so steep that no road can be made up them, so densely crowded with trees that one must haul oneself up, like a monkey, hand over hand, and drag one's baggage up afterwards. The rivers, too, which are the main highways in the flat plain, are here raging torrents, and, though not wide, are so swift and deep that they can be neither swum nor crossed in boats. The



New Guinea

traveller is forced to trust to slender bridges of rattan canes, twisted into two parallel ropes about a yard apart, and held apart by cross ties; these, which form the standard bridges, descend in a steep curve from the bank to the middle of the stream, and rise again on the other side by a slope equally abrupt. One crosses these delightful structures, by standing on the lower strand (which gives way to the extent of a foot or so beneath one's weight), and holding on to the upper rope; meantime the whole thing sways giddily above the milky foaming water. If there is sufficient time a third rope for the hands is made, so that the cross section of the

92 Modern Exploration — Stories

bridge looks like a triangle, but even then to cross such a bridge is not an experience to be recommended to people with weak nerves.

The climate is as bad as the country. Owing to the wet sea winds and the high mountains, it rains for nine months in the year, two or three inches in a day being quite a normal shower. Consequently the rivers rise with extraordinary rapidity, and anyone on the bank who is unable to ascend the hillsides because of the tangled plants may be suddenly caught by the flood and swept away in an instant.

The dark-skinned natives with their frizzled hair (Papua means "frizzled") and their satanic countenances are not such as to inspire confidence in the timid. They are unhealthy too, commonly suffering from ringworm and malaria; the dread fever called beri-beri is endemic there. The Papuans are quite indifferent to work, and make the poorest of porters; consequently the explorer has to bring his own carriers into the country with him, and, as these are foreigners, their mortality is accordingly high. Only the Dyaks of Borneo and adjacent islands, who are hardy, inquisitive, and who like travelling, are of any use to the harassed white man here.

These are a few of the reasons why New Guinea remained unknown for so long after its discovery.

To this uninviting country went, in August, 1909, Dr. H. A. Lorentz, a Dutch explorer, who had already been there two years previously, and who consequently understood the conditions to a nicety. His object was to reach the Snowy Mountains of Dutch New Guinea, and to ascend Mt. Wilhelmina, a peak about as high as Mt. Blanc, but infinitely more difficult to get at.

With him Dr. Lorentz took seven other Europeans, an escort of thirty-nine native soldiers, and 102 Dyak carriers. To feed this large body required more than

twenty-two tons of food, including twelve tons of rice, and depôts had to be made at successive advanced posts, for one man can carry only enough food to last himself for three weeks—two weeks out and one week back.

They made great progress at first, by taking advantage of the trail of two years before; through this a way was cut to their old camp, Alkmaar, on the fringe of the hills, in twenty-two days, and to this place food for the whole party for one hundred days was conveyed.

Despite the incessant work in cutting a path through the dense forest (for one is quite lost in the trees, and, being forced to steer by compass alone, advantage is not taken of the easiest routes); the stumbling over treacherous roots; the halts at unexpected obstacles, such as abrupt hills; and all the discomfort attendant upon driving a hundred loaded natives day after day, good fortune attended them, and it was not until they were in the higher hills, 6000 to 8000 feet above the sea, that their troubles really started. Now, in places, the way up the mountain sides became so steep that they had to cut the path upwards, at breast level or even higher, and then climb the almost vertical slope hand over hand. It rained daily, sometimes most furiously, and everything around was clothed in moss, which gave the trees a curious appearance. When, at rare intervals, they got clear sunlight through, this moss looked wonderful, sparkling in the sun like myriads of tiny gems. The great forest, with its gloom and its musty smell, was silent as the grave; only rarely did they see a bird, and still more rarely a flower.

Eventually they encountered some savages—hill Papuans—who insisted on their visiting the village, which meant a long descent through native paths. The people lived there permanently, in huts of cane thatched with palm leaves; they were friendly, but refused to allow

the party to go. It transpired that Lorentz and his fellow-travellers on the one side, and the hill savages on the other, were to be made blood brothers, and this was done, not by scratching the arms of each, and mingling the blood (as is usual among some savage races), but by smearing the blood from two freshly-killed hogs on to their foreheads. Afterwards the pigs were roasted in pits covered over by hot stones, and all partook of them. These people had bows and arrows, also stone axes.

After leaving the Papuans the explorers found the work still more arduous, the forest continuing to choke up the ridges along which they advanced; but eventually they got through it and reached the foot of the snow-clad peak, only to find themselves faced by an apparently unscalable cliff. A search fortunately revealed a narrow crevice, up which Dr. Lorentz, his comrade Mr. Van Nouhuys, and one Dyak climbed in single file to the bed of perpetual snow that formed the summit. They were now 15,125 feet above the sea; in all directions only lower land met their view, and that land was a misty, rain-swept, hateful forest.

It was 8th November. Dr. Lorentz started to descend, following (as he thought) the crevice up which they had hauled themselves, but it proved to be another. He stopped, slipped, shot down the crack and over a cliff to the ground far below. His companions, more fortunate, got down by the right way, and, hurrying round, found him unconscious and with a broken rib. When he recovered his senses it was found that the injury made it impossible for him to walk, and the three of them, accustomed to the heat and stillness of the forest, had to spend a bitterly cold night on the mountain-side, exposed to the keen blasts of the wind.

Next day help was brought up and the injured man was carried down to the highest camp; farther than that

he could not go, so bad was the trail. Accordingly, most of the men at the camp were sent down to the distant base for more food, while the few who remained (including Dr. Lorentz) had to eke out existence on a ration of rice that soon became but one miserable ounce per day: all other food had given out. It was so cold up there, too, that one Dyak, who had got lost, was frozen to death before he could be found.

After thirteen days of this misery the Doctor's rib had healed sufficiently for him to walk, with great difficulty, some five hundred yards, and thenceforth, by slow stages, they crawled over the abominably rough path to meet the relief party. He says that his hunger was, at first, acute, but after the first few days it gave way to languor, and one walked on in a kind of apathy. The Dyaks' habit of going about without shoes also caused him much trouble; their feet became horribly torn on the rough edges of the broken wood, and they were continually in difficulties. One of them got his foot frost-bitten; foolishly he tried to warm it at the camp-fire and his frozen toes dropped off. To complete the misfortunes of these unhappy wanderers, one day they took the wrong path, arrived at a precipice, and had to go a long way back.

Nevertheless they got slowly away from the peak; but they had not gone much farther when they met a horrible spectacle. One of the soldiers who had been sent back with the relief party had fallen out, and had been left behind. Exhausted by hunger, he was lying by the track, and there he had been, *for fifteen days*, without a thing to eat or a soul to help him. Having nothing themselves, they could do nothing for him, but later on in the same day the relief party arrived. Help and food were at once sent back to the poor soldier, but he died on the way home.

96 Modern Exploration — Stories

The experience of Dr. Lorentz was bad enough, but by comparison with an expedition of Englishmen, which was at the same time endeavouring to reach the snows some distance farther west, he escaped lightly. He owed much, besides, to his former visit, to the path which had been cut at that time, and to his admirable organization and carriers.

The English expedition had been sent there to celebrate the anniversary of the British Ornithologists' Union; its results in collections were admirable, but in lives lost and difficulties encountered it must rank as one of the most unfortunate on record. Led firstly by Mr. Goodfellow and (on his falling sick) by Major Rawling, of Tibet fame, they stayed in the country fifteen months, and even then they never got beyond the first or lowest range of mountains. Unhappily their carriers were not Dyaks, and they died like flies; the river selected for the advance—one of several, all of which were unknown—turned out to be wholly unsuitable, and the forest was of especial density. There was an average daily rainfall of two and three-quarter inches, or about twice as much as falls when it rains "round the clock" in London. "Of 300 men employed during the first twelve months, only eleven lasted out the expedition, and of these, four were Europeans."

The great silent trees, surrounded by lesser trunks, and inextricably tied together by tangles of rattan canes and creepers, formed a hateful greeny-black shade in which they were constantly enclosed; and so flat was the country that only after a long time did it become possible to get a look-out over the foliage. This forest has a peculiarly depressing effect on the spirits. To be left alone in it was, to the white men, an unendurable torture. One Dutch sergeant who was thus, by chance, isolated, temporarily lost his reason, and days elapsed

before he recovered it again. There is ever present the fear of the unknown: the snake which may lie above you ready to strike; the stealthy shadows flitting from tree to tree, whence a spear or a poisoned arrow may start; the darker shadow which may be some shapeless unknown horror of the forest, waiting its opportunity to spring upon and rend you!

The poor distances covered show, more eloquently than words, what sort of a place this is. It took eight men five weeks to cut a path only five miles long, and when it was finished the ground was so rough and encumbered with broken stems that it had to be abandoned. Farther inland, among the hills, there was one place where the ground could not be seen for fallen timber; here their four best men took the whole of one afternoon and the next day to clear a path three-quarters of a mile long.

The British expedition, however, had one piece of good fortune. They met and made friends with a group of pygmy hillmen. These little people go about almost naked, and are only four feet six inches to four feet nine inches high. They live in permanent settlements in little clearings, made, for the most part, with their crude stone axes, or with ancient tools that have been bartered from tribe to tribe. Their houses, of thatch and palm leaves, are built on piles six to eight feet above the ground.

The difficulties of travel are not confined to Dutch territory. They are, at least, equally bad in British territory, which, since the Great War, includes all the eastern half of the island.

There are, however, a number of proper tracks, and the territory is more or less adequately policed by well-trained natives under British administrators.

Should one leave the beaten path one enters immediately a wilderness as wild and savage as that in which we have just been wandering.

98 Modern Exploration — Stories

Only a few years ago Mr. Staniforth Smith, in attempting to penetrate into such a forest, in western Papua, came abruptly upon the edge of a precipice. It was not easy to return, and he could hear, 1200 feet below, the roar of a river which he had been following. He thought that the best way out would be to descend to the river; but when, after infinite difficulty, this had been done, the party found themselves beside a raging torrent; nor was it possible to go back, for the loads of the porters could not be carried up the well-nigh vertical cliff, so heavily was it encumbered by trees.

He realized that a sudden freshet might overwhelm the narrow bank on which his party stood. Accordingly he had rafts made, intending to float down the river, but no sooner were they launched than the turbulent water took them in hand, twirled them over, and shot the unfortunate occupants overboard. A number of men were drowned, and the rest, wet and miserable, passed through a frightful spell of suffering and starvation before reaching safety.

Another well-known New Guinea administrator, Mr. C. A. W. Moncton, made an adventurous crossing of the island from north to south; and he, likewise, upon reaching the southern rivers, attempted to use rafts in preference to crossing that hateful forest. He was unfortunate, however, for the river, though swift, was full of snags, or fallen trees. In trying to avoid these, at one dangerous point, his rafts were upset; some men were drowned, and all the contents, including the whole of their ammunition, went to the bottom. They fished up the bullets, but they might as well have left them there, for they found nothing to shoot. Like Staniforth Smith, they had to tighten their belts, to live on sago and on thoughts of better food, and to struggle slowly on until they reached an outpost.

In the Wilds of New Guinea 99

Finally, I want you to note the name of Mr. A. F. R. Wollaston, an explorer and collector of great experience, who had been high up on the mysterious Mountains of the Moon, in Central Africa, and who had been a member of the British New Guinea expedition mentioned above. He was determined to reach the Snowy Mountains, and he succeeded in doing so, two or three years before the Great War broke out. He, too, returned by water, was upset, and lost all his collections, the results of months of effort and search. So often does it happen among explorers, that one must sow, when another will reap!

I dare say you have read of another case in point, the celebrated naturalist, Dr. A. R. Wallace. He spent several years on the Amazon, collecting butterflies, moths, birds, and monkeys; and when on the way home, with his rich collections, the ship caught fire, and everything had to be abandoned to the flames.

CHAPTER VIII

Endurance in the Antarctic

Although you are hardly likely ever to go exploring in that vast realm of ice and cold, Antarctica, yet it may be as well if I tell you a few things about what men have to go through, who venture into those inhospitable regions.

The story of Captain Scott must—or should—be known to every boy and girl who can speak the English language.

How, having been the first to make great discoveries in Antarctica, he went a second time to that frozen continent, in 1910; how he and four companions, with sledges and dogs, set out from the ship for the South Pole, 850 miles away; how they reached it, man-hauling their sledges, on 17th January, 1912, just a month and three days later than the brave Norwegian, Amundsen; how, without envying their successful rivals, they returned, in the teeth of bitter gales and extraordinary cold, until, at the bottom of a steep glacier, Petty Officer Evans fell, subsequently dying from concussion; how further gales and cold held them up, so that they could not get to the depôts which Captain Scott had provided; how Captain Oates, with his frozen feet and his heart of gold, went out into a blinding snowstorm to die, so that his comrades might not perish also, through slowing down because of him; and how the three remaining heroes, Scott, Bower, and Wilson, were caught in a blizzard which lasted over

a week, and, with their food and fuel gone, died of starvation and cold, nobly conscious of their duty to the end; these things will never die while there is an Englishman to tell the story, or an English lad to listen. One of the things that they did has passed into our language. When Oates had not returned, and a search had failed to find him, they erected a rude cross, on which they cut the words: "Hereabouts died *a very gallant gentleman*."

This ill-starred party displayed, in the highest degree, the quality most essential in the Antarctic, and that is, endurance. Endurance first, last and always is wanted to cope with the bitter temperature, the hardships of the long sledge journeys, and the glaciers, that, like gigantic masses of clotted cream, pour down from the inland ice cap through the high coastal mountains.

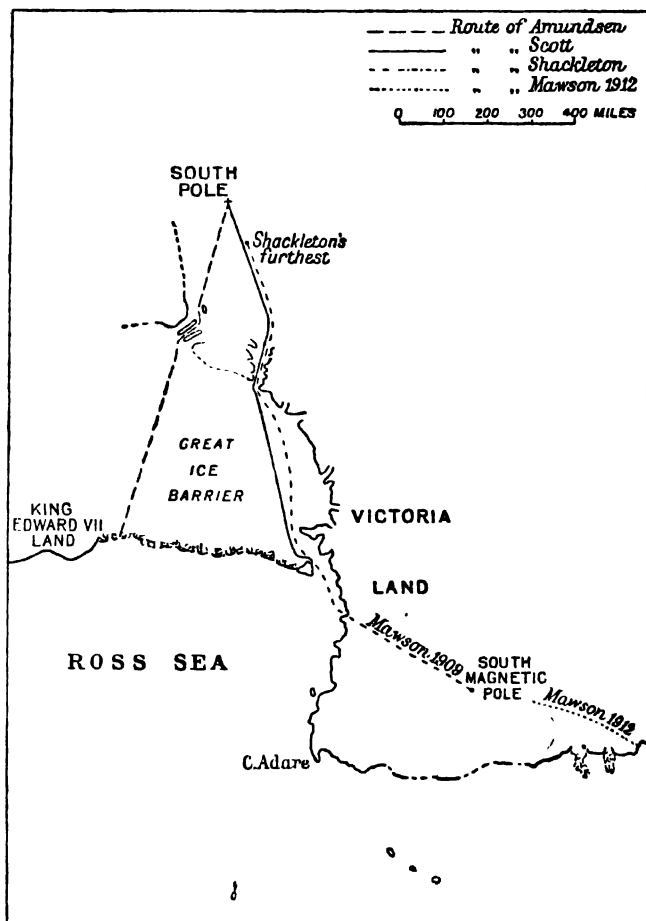
This power of endurance was also shown very finely by a party of Captain Scott's last expedition, who, after their leader's death, were accidentally cut off, and left to spend a whole winter alone.

There were six of them: Dr. Levick, Mr. Priestley, and Petty Officers Abbott, Browning and Dickason, under the leadership of Commander Campbell. They were landed, for special work, on the shore of Victoria Land, on 8th January, 1913, a long distance north of the ship's quarters. You will remember that, in this southern land, January is the height of midsummer; but although an Antarctic midsummer brings plenty of sunshine it is not otherwise notable, there being practically no plants, no land animals, and an almost constant succession of gales; while the temperature rarely rises much above freezing-point, even at midday.

Six weeks later this little party had ended their task, and were back again at the landing-place, awaiting the return of the ship. A continuous gale came on, however, blowing off the land; it lasted twelve days, and at the

102 Modern Exploration — Stories

end of that time it was obvious to all that no ship would be seen that year. Hence they were forced to look around



The Antarctic Regions

for a suitable wintering place, to kill as many seals as possible, and to do, in short, just what Nansen had done

—build a hut, and get through the winter in it as best they could.

They were so dissatisfied with the place of their abode that they afterwards called it, in disgust, Inexpressible Island. Unlike Nansen's, their house was wholly of ice blocks; they were, too, quite unprepared for a long stay. A stove was made out of an old oil-can, and wick out of dried seal bones; their lamp was an Oxo tin, and its wick the thread from one of Campbell's boots. Blubber, as usual, formed the fuel. They evidently had much trouble with their chimney, for the fumes were so dense that the cook for the day would sometimes have to give up and rush outside, tears streaming down his face.

In this primitive place, and in the style with which Nansen's narrative will have made you familiar, these six men contrived to exist until spring came, and only one of them—Browning—became seriously ill. They had one shock, however, all the party, except Campbell, falling victims to ptomaine poisoning just as the spring was coming on. The tin in which they thawed their meat had become so unclean that it poisoned them, but fresh seal meat, and the prospect of a move, saved their lives.

As soon as they could they left Inexpressible Island, and made their way back to the ship, across a dangerous glacier and an immense stretch of sea ice. Without the power of great endurance it is obvious that they would have survived neither the hardships of the long winter nor the subsequent journey to safety.

The year 1912 was a particularly unfortunate one in Antarctic annals. Captain Scott and his companions perished in March. December of the same year saw another sledge party in difficulties which led to a fatal result.

Dr. (now Sir Douglas) Mawson, who was engaged in

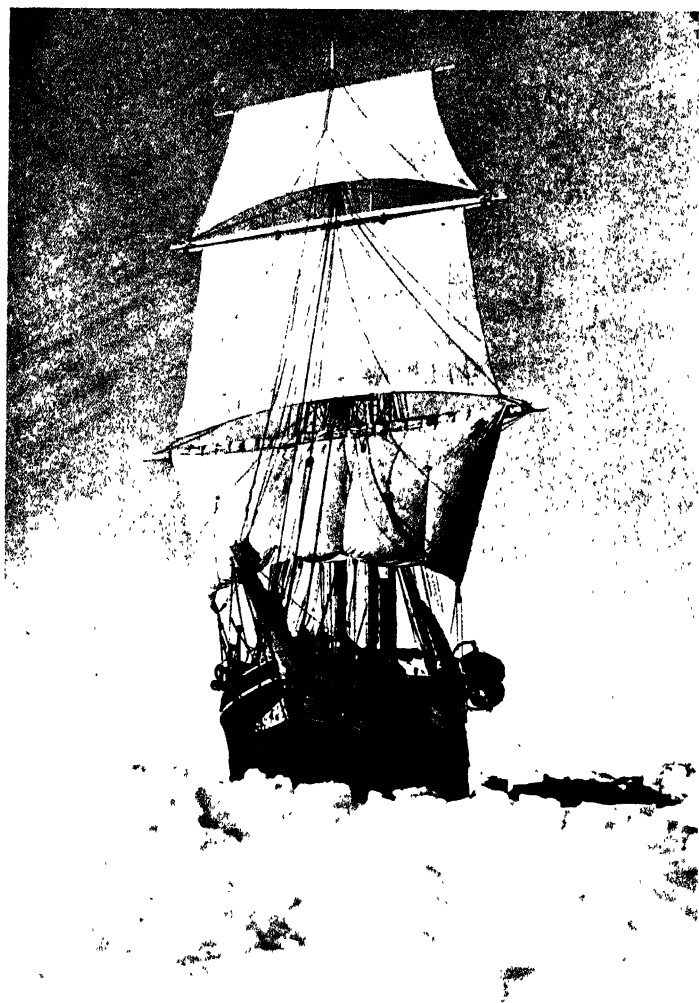
104 Modern Exploration — Stories

exploring another part of the vast ice-covered land, had led a sledge party of three far across the ice cap towards the South. The other members were Lieut. Ninnis and Dr. Merz. When 300 miles from their huts they got into bad ice, and Ninnis was, without the slightest warning, engulfed in a crevice.

These crevices vary from narrow cracks to huge gaping clefts; the opening is frequently covered over by a treacherous snow bridge, and unless the gap is a wide one there is no sag in the middle to indicate the danger to the sledge traveller, until he is upon it. Many have been the accidents recorded, through men falling into these crevices; but, as a rule, either the traces or the sledge have held up the unhappy traveller, enabling his companions to haul him out again. No such good fortune fell to the lot of Lieut. Ninnis; for when the others knelt on the edge, and peered down into the blue depths, he could not be descried; nor did any sound respond to their calls.

With heavy hearts they pushed on homewards; but they ran into severe gales, food gave out, and they were forced to kill their few remaining dogs for food, and to do the hauling themselves. The constant exposure, the unrelenting toil, and the miserable ration told heavily on Merz. He became weaker and weaker, and at last he could go no farther. Although six weeks had elapsed since the death of Ninnis, they were still a long way from their quarters. They stopped to afford the sick man a rest, but it was too late. He died in the arms of his leader on 17th January, 1913.

The predicament of Mawson was now a frightful one. He was alone on a barren plateau 9000 feet above the sea, and absolutely devoid of any kind of life; exposed to fierce blasts of wind, worn down by the long journey, and possessing but little food. The last point was the



ENDURANCE IN THE ICE

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most important, for in that climate one's normal rations are enormous; and if the food supply is diminished, the bodily heat which should fight the cold is cut off, and one rapidly becomes weak. Picture this lost leader, with his solitary sledge, silently trudging over the snow, his dead friend behind him, unknown perils in front! He ran into mists, snowstorms held him up, a maze of dangerous crevices barred his way; and yet, by sheer endurance and what Dr. Wilson, on a famous occasion, called "Slogging on", he fought his way to safety after another six weeks' exposure.

If you want any further instance of the sheer necessity of endurance in the Antarctic, it is furnished by the whole history of Sir Ernest Shackleton. He himself attached so much value to the word, that in his great expedition of 1914-17 his ship was called the *Endurance*; and worthily did she bear the name, even though she now lies rotting on the floor of the Antarctic Ocean.

His power of pulling through—the "will to win"—was magnificently shown in the first expedition in which he acted as leader; when, with three companions—Wild, Adams and Marshall—he made one of the finest sledge journeys on record.

They had provisions for ninety-one days, carried on sledges drawn by Siberian ponies. They advanced towards the South Pole along a line of depôts parallel to those of Scott's first great journey, but well out to sea, the immense surface of the Ross Barrier ice extending before them like a seemingly endless plain.

Despite a bad surface and constant head winds they made some fifteen miles a day; but eventually, when in Lat. 81 degrees, the first pony had to be shot and used for food. A week later, the second one went the same way, and four days after that, the third; there was only one pony left now, and he was kept for hauling.

106 Modern Exploration — Stories

Hereabouts they came to the end of the great Barrier plain. A promising way up into the mountains, towards the unknown south, was afforded by a giant glacier, which went upwards and onwards far beyond their range of sight. They named it the Beardmore Glacier, and took their one pony upon it; but their boots were not equipped for mountaineering, and they had many slips. They had but two sledges now, and soon they were forced to do all the hauling themselves, for the last pony fell down a crevice and was killed.

The crevices now became so bad that at one place they were six hours in getting the two sledges over a space of 600 yards. They had now exceeded their time, and food rations were cut down, but the glacier still led upwards, first to 6000 feet and then to 9000 feet above the sea; doggedly they followed it to the top.

On the last day of the year they were on the ice-covered plateau—a vast frozen wilderness essentially similar to that of Greenland; and here their observations showed that it was still 186 miles to the South Pole, while they were more than 650 miles away from their base.

“We were weakening,” says Shackleton, “from the combined effects of short food, low temperature, high altitude, and heavy work.”

No man knew better than he what that weakening meant; for he himself had broken down on Scott's great journey seven years before, when the then “farthest south” was reached by Scott, Shackleton and Wilson, and it was only with difficulty that the others conveyed him to safety, although they were hundreds of miles nearer to the ship.

But the courage of the man was indomitable. If they could not reach the Pole, at least they would get within 100 miles of it.

They set out once more, and, despite a two days'

blizzard, which forced them to lie idle, consuming their precious food without advancing an inch, they attained their end. On 9th January, 100 miles from the South Pole, they hoisted their flag, photographed it, and returned. It was not a moment too soon.

They now found that some of the pony meat was diseased, and this brought on dysentery, which weakened first one and then another of the party, besides greatly delaying the return journey.

One stroke of good fortune they had, however, and that was in the wind; for the bitter head winds with which they had had to contend on the way out now helped to blow them back to safety. By rigging up a sail on the only remaining sledge, they took full advantage of this circumstance, covering twenty-nine miles in a single day, but their plight was a desperate one.

They had laid out a depôt on the Beardmore Glacier, but ran out of food when sixteen miles from it, and were forced to march for thirty-one hours "with only a little tea and chocolate". Despite every effort, however, they broke down within half a mile of the depôt; but Marshall, who was then the strongest, went on alone and took back the much-needed food to the remainder.

So they struggled along, over the hundreds of miles that still had to be covered ere they reached the winter quarters; reaching each successive depôt with their sledge empty, and constantly struggling against the weakening effects of dysentery. Finally Marshall broke down through this complaint. Adams remained with him, and the other two—Shackleton and Wild—went on, reached the ship, and then rescued their comrades.

Reading between the lines, it is obvious that it was "touch and go" throughout the whole return march; only a blizzard such as Scott encountered in 1912, or

108 Modern Exploration — Stories

the phenomenally low temperatures and bad weather of that fatal year, and the gallant Shackleton would have anticipated the fate of his old leader.

Fired by the glory that he acquired during this expedition, and undeterred by the hardships with which he was so painfully familiar, Sir Ernest Shackleton made yet another attempt to penetrate the Antarctic wilds, after the Scott disaster.

His plan was bold but—in the opinion of those best able to judge—wholly practicable. He intended to sail to the opposite quadrant of the continent to that on which so much work had been done; to force his ship through the ice-strewn Weddell Sea to the land; to leave her, with all his equipment and men, and to cross the continent, passing the Pole, and finishing up at the scene of his earlier exploits, where another ship would await his arrival.

For a long time, moreover, all went well. The public subscribed the funds, always a difficult and delicate point. The ship—the *Endurance*—was as stoutly built as any man could desire. The long journey across the world ended in the penetration of the pack ice of Weddell Sea, and the attainment of a higher latitude than any other ship has ever reached in that part of the Antarctic. Only a short distance separated them from land, when, in a sudden storm, the ice floes closed round the *Endurance*, and she was hopelessly frozen in. This was in mid-summer (January), 1915. Efforts were made to cross the ice to the land, but were unsuccessful. All that Shackleton could do now was to sit tight, like Nansen, and hope that the currents would carry his ship free in the end. Meanwhile, scientific work of the very highest importance went on steadily; but, so as to be prepared for any eventuality, stores and boats were landed on the ice. The ship, drifting steadily northwards, survived most of the

winter; but at last, in November of that year, she was crushed and sunk.

Shackleton and his men were now in a pretty plight. They had plenty of stores as well as boats; but they were on the open floes, hundreds of miles even from the desolate South Shetland Islands. Summer was coming on, and in the summer it might not be practicable to move. They set out northwards, and after an adventurous six months eventually reached Elephant Island, one of the South Shetlands. Here it became necessary for someone to bring relief, so Shackleton and a few others went, in one frail ship's boat, right across the stormiest ocean in the world to South Georgia (thence to Chile), organized a relief expedition, and eventually brought all his party into safety without having lost a single man. In my opinion this expedition displayed his great qualities of leadership in the highest degree, for although it is easy to be great when successful, true greatness shows brightest in the dark hours of adversity.

CHAPTER IX

The Attack on Mount Everest

To men of any spirit the opposition of Nature constitutes a challenge which cannot be ignored. The sense of battle rouses a fierce joy in them that no mere adverse reasoning can ever destroy, and the very idea of impossibility is foreign to their natures. This spirit taught men to fly, regardless of the laws of gravity. It taught them to rush along the ground at speeds exceeding three miles—now almost four miles—in a minute. It taught them to jump down through thousands of feet of space aided by nothing better than something resembling a large umbrella.

The same spirit actuates mountain climbers. No sooner do they perceive a peak than they must climb it. Although there are good scientific reasons for climbing mountains, they are not very strong ones; the *moral* reasons are far stronger. It is a noble thing to endeavour to surmount difficulties and to penetrate into realms where ordinary men dare not venture. The risks, always great, are proportionate to the enterprise. How great they may be when climbing the greatest of mountains will be illustrated by this narrative of the attack on Mount Everest in 1921, 1922, and 1924.

Besides being a good explorer in the ordinary sense, a scientific mountaineer must be something else. He must have an eye that quails not when contemplating a drop of thousands of feet, sheer from the precipice on whose

edge he stands, and he must be sure of his limbs when the same nerve-shaking view becomes discernible from between his legs. It requires much self-reliance to scramble round an overhanging rock when hands and knees alone can be used, and one's feet dangle in mid-air; while an equal degree of confidence in one's companions is needed when, roped together, three or four men cross a dangerous glacier, for a single slip may result in the death of all. Watchfulness is another essential quality. Mists often arise with wonderful suddenness, leaving one practically blinded—perhaps upon the edge of an abyss; and the rolling stones that precede an avalanche, the distant roar that may betoken the bursting of an ice-dam, and the flooding of one's road, not to mention the yielding of the treacherous snow-bridge upon which, heart in mouth, one crawls across a yawning crevice: all these things call for incessant alertness.

Finally, the taking of observations, the mapping of prominent points, and even the ordinary routine of cooking, eating, and sleeping are just as difficult at high altitudes as they are in the paralysing cold of the Antarctic.

Adventurous mountaineers have climbed the Alps from end to end. Chimborazo and Aconcagua, the greatest summits of the Andes; Mt. McKinley, the highest spot in North America; the solitary peaks of Kenya and Kilimanjaro, the culminating points of Africa: have all been ascended. Even the smoking but ice-bordered Erebus, in Antarctica, has succumbed to man's ardour and energy.

The Himalaya Mountains, however, are so vast that, although frequently attacked, their thousand summits are still nearly all unscaled. As recently as 1920 Mount Everest, although known for three-quarters of a century, had been seen only from fifty to a hundred miles away. It is a huge pyramidal peak, 29,140 feet high, which

112 Modern Exploration — Stories

dwarfs everything in the vicinity. The natives call it the Abode of the Goddess, and political considerations ordained that until the last few years that splendid shrine should remain undefiled by the presence of man.

This immunity of the world's highest mountain was not due to any lack of British enterprise or curiosity, but solely to the fact that Everest is in Tibet, and our relations with that country, with its parent China, and with Russia, would not permit an earlier attempt.

Meanwhile surveyors, travellers, and sportsmen, hastening away from the burning plains of India and the fever-haunted jungles of the foothills, had expended their energies in other parts of the Himalaya, especially in the Karakoram, at the western end. It is in high mountains that Nature is driven to her last and most savage fastnesses, and the higher one goes the greater is her resistance. Thus any climb above 20,000 feet was notable, while to camp for the night at such a height was regarded as the acme of discomfort. Above this point the risk of terrific avalanches, the very great steepness of the slopes, the fierce burning caused by the sun's ultra-violet rays through the thin air, and, worst of all, the biting winds, rendered farther advance most difficult. Nevertheless, man mastered the altitude problem bit by bit, just as he has mastered so many other things by concentrated effort.

A famous climber, Dr. Longstaff, climbed a peak (Trisul) that was 23,400 feet high, and had actually reached 24,000 feet on another mountain, when he and his party were all swept down by an avalanche, and preserved from destruction only by a miracle. Dr. Workman also attained 23,400 feet, while his gallant wife in another ascent reached a height never braved before by any lady. An officer of the Indian Survey, Mr. Meade, actually made a camp at 23,500 feet. Finally,

the Duke of the Abruzzi, an Italian prince who is the very embodiment of adventure, climbed up the massive Bride Peak to 24,600 feet, and was kept from reaching the summit only by bad weather. Up to the time of the Everest expeditions this was the record.

Several times, before the Great War, Sir Francis Younghusband, of Mustagh Pass fame, and General C. G. Bruce, a very experienced mountaineer, had thought of climbing Mt. Everest, but they were always stopped by the Government. After the War, however, a favourable opportunity arose. Two great societies, the Alpine Club and the Royal Geographical Society, found a large sum of money, and Colonel Howard Bury went to India, at his own expense, on the very difficult and delicate task of getting permission to ascend the mountain. He was successful. Application was made by the Indian Government to the Dalai Lama, the religious ruler of Tibet, and permission was granted for the expedition to enter Tibet. Thus was the first obstacle surmounted.

Meantime a strong committee was formed to consider the best way of going to work. Everest is no ordinary mountain, and is, in fact, so much higher than those hitherto climbed, that the ordinary mode of proceeding, by a small determined party, would be foredoomed to failure. The air, which has a pressure of about thirty inches in London, gets less and less as one ascends; at 15,000 feet it is only about half as great; and from this height to that of Mount Everest (29,140 feet) it continues slightly to diminish. This rarefaction of the air at high altitudes has a curious effect, for the most energetic men are so severely attacked by lassitude as to be capable of exertion only by strong will power, while the loss of oxygen makes it needful to gasp for breath at every few steps. Climbing becomes slower and slower; thus the Duke of the Abruzzi, when near the end of his great

114 Modern Exploration — Stories

Himalayan effort, could rise only 160 feet vertically in an hour. This fact, and a little arithmetic, shows us that one could not possibly hope to climb Everest in a single day, even from a camp at 20,000 feet. It would be absolutely necessary to make camps, one above another, wherever opportunity offered on the sides of the peak. Moreover, the mere effort of making a camp causes great exhaustion at such heights, and as the climbers would need every ounce of strength, if they were to stand any chance of getting to the top, it was considered wise that all the many things which must be carried up from level to level, should be carried by porters; and this meant a large organization, with an expert in charge at the base, and another to supervise the passing up of the goods. Finally, experiments were made, in special rooms, upon an actual climber, to study the effect of the lack of oxygen, and to see if the administration of pure oxygen in small doses would assist him. The idea seemed sound, and many cylinders of oxygen were taken. They were undoubtedly very useful, but they were much too heavy, as they weighed 5 lb. each—a severe handicap to an almost exhausted man.

Younghusband and Bruce were again the sponsors of the expedition. They were assisted by Dr. Longstaff, whom I mentioned just now; by Dr. Kellas, whose five previous expeditions to great heights in the Himalaya gave his presence a special weight; by Colonel Howard Bury, Dr. Harold Raeburn (chief of the climbing party), and several picked officers of the Indian Survey, and members of the Alpine Club. Applications to join were received from all parts of the world, but the expedition was British throughout.

Every man engaged had to be absolutely physically fit, for high altitudes find out any weak spot in one's armour. A peculiar affliction is mountain sickness. Having only

reached the modest level of 16,000 feet myself, and with no worse experience than a headache, I cannot say much about this, but I know people who have had the most disagreeable symptoms. Mountain sickness, in fact, can prostrate a man, but it is highly capricious, and will incapacitate some members of a party although not affecting others who are exposed at the same time. The Everest expeditions fortunately had very little of it, except once or twice amongst their carriers.

The selection of the men, the estimating of supplies, the purchase of animals, and the packing of stores in small, readily available parcels, all took much time and careful thought. This work fell mainly on General Bruce and Colonel Howard Bury.

Next, as Dr. Longstaff had pointed out, it was necessary to *find* the mountain. The peak of the huge mass was sufficiently well known from a distance; but around it lay a zone, fifty miles wide, of deep gorges, rushing torrents, glaciers, and minor mountains, all completely unexplored. Accordingly the year 1921 was wisely devoted to reconnoitring the ground. The season during which actual climbing might be possible comprised little more than a month, and Everest was certainly not assailable at more than one or two points, if at all.

Howard Bury led the reconnaissance. Drs. Raeburn and Kellas, with Mr. G. L. Mallory—of whom more anon—and Mr. Bullock, formed the climbing party. Major Wheeler, who had done much splendid surveying in the wildest Rocky Mountains, was to make a map, aided by Major Morshead. Dr. A. F. R. Wollaston, whose mishap in New Guinea has already been mentioned, was doctor and naturalist. Dr. Heron was to study the geology.

They started from Darjiling, a town in the North Indian hills, 7300 feet up, and reached by a wonderful

116 Modern Exploration — Stories

railway. The main party, with fifty mules and their attendants, besides twenty-two picked porters, left on 18th May; another fifty mules followed on the 19th.

The start was not auspicious. Knowing the bad conditions to be expected, the very best Government mules obtainable had been procured, but they were so fat and well fed as not to be able to stand up to the hardships, and their breakdown a few days after starting, caused some delay and confusion until hardier beasts were bought.

Incessant rain greeted the expedition in the hot, fetid, and vegetation-choked Teesta valley; nor did these conditions cease until they crossed the Jelep Pass into Tibet, and, on descending the valley of the Chumbi River to the north, encountered a colder and drier climate. Now beautiful masses of rhododendrons of many kinds bordered the path; in the meadows were countless purple, white and yellow primroses; the dense woods gave place to more open country; and the inhabitants, although curious and indescribably dirty, were not unfriendly. The powerful mandate of the Dalai Lama ensured for them a good reception at the numerous monasteries, an important matter in this priest-ridden country. That insidious disease, dysentery, however, seized several members of the expedition before they had been very long in Tibet; Dr. Raeburn, the chief climber, became ill; and, to crown all, Dr. Kellas suddenly collapsed from heart failure, and died at Kampa Dzong, only ninety miles across the frontier. He was buried there, with great solemnity, in sight of the mountains he had loved so well. The leadership of the mountain party then devolved upon Mallory.

The route to Everest described a great curve round its eastern and northern sides, nearly two hundred miles in length. The most obvious line of approach lay up one

or other of the gorges which carried ice-cold water away from the glaciers at the foot of the mountain; but these streams had slopes as severe as those on an English hill road, and were largely impracticable of access. Consequently the indirect route through populated country farther north proved in the end to be both easiest and quickest.

By travelling thus, however, they had to run the gauntlet of Tibetan hospitality; to pay ceremonial visits to Lamas; to endure the inquisitive obstruction of the populace; and to drink ceremonial tea, a nauseating mixture of coarse tea, water, rancid butter, and salt. The beginning of June brought the warm wet monsoon wind, the streams on the plateau were flooded, and the mountain and its surroundings were buried by continual storms. However, advantage was taken of the many halts to glean facts concerning the people, and to photograph them and their homes.

The monasteries, although brightly painted—usually in red and gilt or some other gaudy mixture—were by no means clean. They often contained hundreds of monks in a marvellous condition of filth, wearing long greasy robes, and markedly Chinese in aspect; but very simple, child-like, and easy to get on with once their confidence had been won. Their personal habits took a lot of getting used to. No Tibetan, be he monk or otherwise, loves water. The majority never wash at all, while those who do wash indulge in this luxury so rarely as to be indistinguishable from the rest. The stale smell of unclean bodies, combined with the fumes of incense, the stench from rotten fat, and the still worse smell from open drains and masses of garbage, so tainted the air that, in a head wind, a monastery might be sensed long before it came into sight.

This is not the place to speak of the many curious

118 Modern Exploration — Stories

Tibetan customs; but one, at least, must have revolted our travellers. When a Tibetan dies his body is usually handed over to a butcher, who cuts it up and exposes it to the vultures. When the bones have been picked clean, they are ground up by the butcher and thrown to the winds. This mode of leaving the world is not likely to appeal to the fastidious.

Throughout the summer work went on. Wheeler made a most excellent map, often under circumstances of much difficulty and exposure to cold and mist. Heron worked out the geology. Wollaston collected everything that moved or grew. Bullock and Mallory, with Morshead, Wheeler, and Howard Bury, tried various lines of approach to the peak, and the last-named had, in addition, to keep all parties supplied with stores. It was not until September, however, that any practicable way to the peak was discovered.

You can imagine Everest as a stupendous pyramid, the top of which has been cut away, in a slowly-rising slope some two miles long. At one end—the west—a minor pyramid rises above this last for a further 800 feet. On all sides the very steep walls of the main pyramid are most difficult of access, and even at their bases the height is 20,000 feet or more, yet unless a practicable way for laden porters to the base were found, and then a way up which loads could be carried or dragged to at least 23,000 or 24,000 feet, the further climbing of the peak would be impossible.

By repeatedly probing the glaciers and subsidiary ridges, it gradually became clear that the only possible way was on the north-east, where a glacier nestled under the shoulder of Everest, with its surface some 21,000 feet up. Above this glacier a pass, choked with snow and ice, rose to some 23,000 feet—this they called the North Pass. If a camp could be placed on the pass, a

way up the steep shoulder might be made, certainly to 25,000 feet, and possibly to the summit of the lower pyramid; then two miles along the ridge, and only the final pyramid's 800 feet would remain.

This sounds very simple; in reality it proved to be most difficult. It was mid-September; the monsoon snow buried everything; constant storms and mists obscured the view; and under such conditions to climb the 2000 feet to the North Pass up almost vertical ice slopes and corridors, cutting steps as one advanced, was an extremely hazardous undertaking. Indeed, it was Younghusband's experience of the Mustagh all over anew, but upwards, and with a party of experienced alpinists.

Roped together, they cautiously made their way up the edge of the pass, and on 24th September reached a snow ledge just beneath it, which would do well enough for a high camp. Above them to the west rose Everest, a majestic curve of mountain, huge, menacing, and swept by incessant whirls of powdery snow. How the wind howled up there! They were to know all about that wind, both soon and in the years to follow.

The party comprised Morshead, Mallory, Bullock, and Wheeler. They made an effort to climb higher, but as soon as they rose above the level of the pass the west wind, sweeping over the top like a hurricane, drove them back by its fury and its bitter cold. To complete their discomfiture a blizzard descended upon them ere they could get away, and for four whole days they stayed up there in the tents, in a spot almost as cold as the Antarctic and quite as desolate. When the gale ceased the white mantle of winter was rapidly shrouding the peak. To continue under such conditions would be suicidal; besides, the main work of the season had been accomplished. They broke up camp; the equipment was collected at lower levels; the mules staggered over the

120 Modern Exploration — Stories

Jelep Pass once more; and most of the party returned to England. Man had looked at the mountain and had gone away to think over his next move against it.

During that winter preparations went ahead for the assault proper. In the spring of 1922 a still more formidable expedition assembled at Darjiling, ready to set off as soon as the winter snow should melt.

General Bruce was the leader. The redoubtable Longstaff was a lieutenant. These and Messrs. Strutt, Mallory, Morshead, Norton, Somervell, G. Bruce, Finch, Wakefield, Morris, and Crawford, with Captain Noel as official photographer, formed the European contingent. There were four strong Indian N.C.O.'s and a large party of picked porters and mules. Everything, down to the merest detail, was thought out beforehand.

They left Darjiling on 26th March. Despite several trying experiences in Tibet, such as being held up by blizzards, they reached the base of the Rongbuk Glacier, ten miles below the North Pass, by the end of April. Here they established a Base Camp. The place was a bleak wilderness between two bare mountain walls, and was 16,500 feet above the sea and five miles beyond the Rongbuk Monastery. The near presence of the monastery proved a good thing; for the wind blew away from the glacier, and the Head Lama, a most holy man, officially blessed the expedition. This made the porters feel more comfortable, so that they gave no trouble.

There had not been sufficient time in 1921 to explore the glacier downwards from the North Pass to the monastery, but it now turned out to be an eastern branch of the Rongbuk Glacier. The first thing then was to find a way up it to the pass, which the coolies might follow, and to establish camps two or three miles apart.

On 2nd May Strutt, Norton, and Finch marched a short way up the east branch and there established

Camp I, at about 18,000 feet. Three days later Strutt, Norton, Longstaff, and Morshead pushed farther up, and after much difficulty established Camp II, on 7th May, at 19,360 feet. Longstaff now fell ill with influenza, but the others went on, and on 8th May established the Advanced Camp (No. III) at 21,000 feet, near the base of the North Pass ice-cliffs. They then returned. Longstaff was no better, and eventually had to be carried back to the Base Camp.

Meantime other members of the party were extending their radius of action; heavily laden coolies staggered and slipped up the treacherous slopes; stores were successfully gathered into each high camp; and a few days later Mallory and Somervell fixed ropes up the steep North Pass side to help the porters to ascend. All was a hive of activity, it being understood that the activity became less and less as the altitude increased.

On an ordinary glacier such progress would have been very slow, but this was a most extraordinary glacier. Parts of it were frightfully rough, being nothing but a mass of ice peaks, each from 50 to 100 feet high, and as jagged as a saw edge. Round these strange frozen needles laden men had to wander until they came to the clear ice; and on the latter, although there were not many crevices, the going was very bad, as the snow usually melted off early in the day and left the worst of footholds. Right down the centre of the glacier ran a trench nearly as wide as the Thames at London, and considerably deeper: this was obviously a waterway in times of melting, but at present it might serve for a road if a means could be found of reaching its floor. Morshead successfully tackled the difficulty.

Glacial lakelets of great beauty occurred among the fantastic ice spires, but these did not contribute to the advancement of the expedition. Nor did the climate

122 Modern Exploration — Stories

help. By day the sun shone with great ferocity, its rays burning through the thin air so that a solar thermometer would register 180 to 190 degrees Fahrenheit; despite this the winds were terribly cold. At night the temperature fell to far below freezing-point, and the rushing rivulets were chilled into solid ice.

On 17th May they went one step farther. Strutt, Morshead, Norton, and Somervell, with coolies, all roped in parties, climbed with stores from Camp III to Camp IV, in mist and wind, just below the summit of the Pass. The route was so precipitous that steps had to be cut with ice axes, but eventually they dumped their loads at Camp IV, 23,000 feet above the sea. At this point Strutt, who had gradually fallen back from the lead to the rear, experienced so much difficulty in breathing and climbing that he decided to leave himself out of the climbing party of which he was the head. In his eyes, as in those of all the rest, one individual's mis-haps mattered nothing; it was the expedition which counted, and only the soundest men must go on.

Time was running away. If the monsoon were to start early in June, bringing with it snowstorms and bad weather, all the hopes of the climbers would be dashed. Although it might have been advisable to make the first attempt on the summit with the aid of oxygen, Captain Finch (who had charge of that section) was ill at the base; the apparatus, moreover, had not yet been got up so high. Accordingly the first assault was made without it, by Mallory, Somervell, Morshead, and Norton. They intended to make one more camp, and, after spending the night there, to dash for the summit. Remember, they were already almost as high as anyone had ever been, and were sleeping at 23,000 feet, a thing endured by men only once or twice previously.

The weather, which had been wild, with strong westerly

gales, now improved. In bright sunlight, on 20th May, all were ready to start—all but the most important members, the porters, who had gone down with mountain sickness. Treatment with fresh air revived them sufficiently to enable a start to be made one hour late; and hours count as days upon high mountains.

As soon as they climbed above the Pass to the snow slopes leading up to the north-east face of Everest, the wind began to rise again, and its cutting blasts drove them round to the east side of the ridge for shelter. The way became extremely steep and slippery, the rocks tilting towards them in overlapping layers, like broken tiles, and sometimes concealed by ice and snow. At the worst places steps had to be cut, a slow and galling process at any time, but doubly so in that bitter wind, and at a height when every effort was required to collect air for the lungs, not to expend it in work. At 25,000 feet a sort of shelter offered beneath some rocks, and here two small tents were pitched on the sloping mountain-side, it being impossible to level them up properly. They were now higher than men had ever climbed before. The porters were sent back, and the four Europeans, after the great labour of cooking food and boiling water, spent a most unhappy night, the uppermost man in each tent rolling down on his unfortunate neighbour and crushing him against the sharp stones. Worse troubles had already appeared. The cold wind, in fact, had wrecked their enterprise. One of Norton's ears was swollen to a huge size by frostbite; Mallory had three frostbitten fingers, and Morshead, who had put on his windproof clothes too late in the day, was really ill. To add to their misfortunes, snow and hail fell during the night. The prospect of walking next day up a slope like a house-roof, which was covered with snow and loose ice, was not a cheerful one.

124 Modern Exploration — Stories

They rose at 6.30 but could not get the cooking done until 8 o'clock. Immediately after the start, Morshead found that it was impossible for him to proceed, but the rest climbed on, pausing frequently for breath, and noting the tremendous rate at which their hearts beat. They went slowly and ever more slowly, only a few steps at a time. At last they stopped, having just failed to reach the summit ridge of the truncated pyramid. They had attained 26,986 feet; and here Somervell photographed his companions—the highest snapshot ever taken up till then. The climb from the camp below (No. V) was only 2000 feet, but it took them more than six hours; two hours sufficed to bring them back again to Morshead.

It was then four in the afternoon. Leaving the tents, they stumbled down the treacherous slopes, the only fit man being Somervell. Morshead kept up with difficulty; the others were both frostbitten. Suddenly a slip occurred and three men fell; but the leader thrust his ice-axe deep into the snow, and the rope safely took the strain and held them up from a glissade to certain death. Darkness was falling; ominous lightning flashed across the sky; the steps which had been so laboriously cut on the ascent could not be found, and the situation looked serious. Nevertheless, they stumbled down to the North Pass in safety.

At this point further descent was hindered by the ice-cliff with its deep gashes. It was now quite dark, but so still that Somervell lit a candle, and by its aid the four men tried to find the guide ropes, which had been buried beneath the new snow. At one moment they had to jump fifteen feet down a little cliff into a snow bed—by that feeble light it might well have been fifteen hundred—but they took the risk, and landed without an accident. The light went out. To stay up there in the

intense night cold would certainly have meant the death of some of them, if not of all. In the darkness they still searched for the guide rope, and by a happy chance it was found. They now got safely down to Camp IV, only to find that the porters had all gone, and had taken the cooking apparatus with them. However, they had at least a shelter. After six weary hours of darkness they started anew the next morning, and by noon four worn-out climbers staggered into Camp III, where they were cared for, and passed on to the Base Camp. Three of them rapidly recovered, but Morshead was ill for a long time, and for months looked like losing several fingers.

From this experience you will see that it was one thing to climb upwards on Everest, but quite another matter to descend again.

A second attempt was now afoot, with the use of oxygen, the climbers being Captain Finch and Geoffrey Bruce, with Tejbir, a Gurkha N.C.O. They started from Camp IV on 25th May, with porters carrying supplies and oxygen cylinders, but wind and weather were both against them, and at 2.0 p.m. a camp was made at about 25,500 feet, the porters then being sent back. They had climbed thus high along the ridge, and, believing that the actual crest is less exposed to the wind's full force than the windward side, had pitched the tent on the very edge, with a great cliff descending for nearly a mile to the glacier below. The wind grew to a howling gale. Snow penetrated their frail covering, and a layer of it covered everything; the tent strained and tugged at its ropes, as if the whole affair, with its human freight, would blow over the precipice at any moment; and at last they had to reinforce the guy ropes with their alpine ropes, for fear lest they should be carried away. At this spot they spent an unforgettable night, the gale howling outside, and the tent walls flapping madly. During lulls

126 Modern Exploration — Stories

they crawled outside to assure themselves that the ropes still held; but the icy wind drove them back again within a few moments. Morning brought no relief; nevertheless Finch was determined to see it through, and Bruce and Tejbir gamely supported him. They stayed the whole day in the tent, conscious of hunger (for they had taken only one day's rations); but towards evening, porters from Camp IV brought up flasks of hot food and tea from Noel, who was watching from below.

A second night in that wild spot was made tolerable only by the use of oxygen, small doses of which ensured some repose to all three. Before day broke again they prepared to start, the wind having dropped, and presently the sun came out. But the conditions were arctic, for their boots had frozen hard and had to be banged into shape before they could be got on. The weight of their equipment was considerable—40 lb. each for the Europeans and 50 lb. for the Gurkha.

As soon as they started climbing, their old enemy, the wind, commenced to howl, as if Everest had deliberately called upon its powerful aid against the assailants. After going some way Tejbir collapsed, and in his fall crushed some of the invaluable oxygen apparatus. The others sent him back to the tent, the only man of his race who had ever reached such a height, and then pushed on once more. The actual climbing, though slippery, was easy; with the aid of the oxygen they surpassed the height of Mallory's party, besides getting very much farther along towards where the western pyramid, grim and snow-flecked, rose into the sky. Soon they were only half a mile from the summit, although still 1700 feet below it.

Another accident determined their fate. Bruce's oxygen apparatus went wrong, and while, gasping, he was connected up to Finch's tube, his companion repaired

the damaged cylinder, surely one of the most remarkable mechanical jobs on record, carried out five miles above the seal. They were at the end of their tether however. Weakened as they were by hunger and by two nights' exposure at a great altitude, the final climb appeared to them impossible, for even if they reached the top it was most unlikely that they would ever get back. They returned to their high camp, picked up Tejbir (whom they found fast asleep), and hastened to descend. The faithful Noel, who had been watching their progress from the bitterly cold and exposed North Pass, guided them down to the glacier, but even so they were dead beat at the finish. Bruce was badly frostbitten and had to be taken down to the base on a sledge, but Finch had suffered less. Thus assault number two failed.

Although the monsoon might come at any moment there was still time for a final attempt. Mallory, although the great exponent of climbing without oxygen, consented to go up again carrying cylinders of the gas. Somervell and Finch accompanied him, with Wakefield and Crawford in support.

They left the base on 3rd June; immediately afterwards the monsoon broke and a snowstorm held them up for thirty-six hours. Now that the enterprise was under way, however, they would not stop, but Finch had to give up at Camp I, not having recovered from his great climb of a week before. The others reached Camp III on 5th June, rested a day, and on 7th June started up the precipitous face of the North Pass. They were roped in four parties—Mallory, Somervell, and Crawford, with fourteen picked porters. When only half-way up disaster overtook them. An avalanche of snow carried them all away, and two whole parties were swept into a crevice. The remainder, picking themselves up, and surprised to be still alive, hastened to the edge and began

128 Modern Exploration — Stories

a frenzied effort to rescue their comrades from the masses of snow and ice. Two men were brought up alive, and six dead; the ninth victim was never found. So ended the third and last attempt on Everest in 1922, in an atmosphere of gloom and disaster.

But man, though beaten, was loth to admit the fact. Preparations went forward for another attempt. Again Government permission was sought and obtained, and again, in 1924, many of the heroes of the first assault were gathered together at Darjiling. General Bruce was once more the leader, with Colonel Norton as second in command. Mallory led the climbers, supported by the hardy Somervell. Geoffrey Bruce commanded the transport; Noel did the photography. The new-comers were Messrs. Beetham, Hingston, Hazard, Irvine, Macdonald, Odell, and Shebbeare. As on the last occasion every man pulled his weight to the uttermost, but Everest won in the end.

At first they met with extremely bad weather; howling gales of bitterly cold wind stormed upon them; the mist, snow and low temperatures were altogether abnormal. General Bruce became ill in Tibet, and Norton took over the leadership. Camps were pushed up the glacier, as in 1922, but they had to be abandoned one after the other, and a retreat made to the Base Camp owing to the incessant storms. There were many minor casualties among the porters, due to frostbites and snow-blindness, and one Gurkha died.

A rest at the Base Camp and the official blessing of the Rongbuk Lama revived the drooping spirits of the carriers. Again they started, and again they reached Camp III, beneath the fatal ice-cliffs of the North Pass. The greenish-black mass of Everest towered above them, majestic in its strength and size. The climbers were troubled with harsh dry coughs, Somervell being the

worst sufferer; Mallory also was far from well. Owing to changes in the ice at the North Pass there was much difficulty in getting up to Camp IV, Somervell, in a state of high fever, being forced to return to No. III. By persistent work, however, a new route up the Pass was evolved, and up this, on 21st May, Somervell, Irvine, and Hazard guided the porters. At one narrow steep stretch—an "ice chimney", as it is called—the way proved too narrow for most of the loads, which had to be hauled up vertically by main force, Hazard directing this hard work from above.

All the while it had been snowing intermittently. Now, to make matters worse, it snowed throughout the day, while on the succeeding night they made an attempt to sleep in that frightfully exposed spot, with 56 degrees of frost, a heavy wind, and very rare air. With grim determination they all hung on at Camp III, starting afresh with the loads on the 23rd, when the weather brightened. Once more a midday snowfall upset everything; the treacherous cliffy slopes could not be crossed for fear of another avalanche; and Hazard, with a dozen porters, was stranded near the top. Despite this, he guided eight of them down to the comparative safety of Camp III, but the remaining four men, taking fright at a steep ice slope which ended in an abyss, remained above, and could not be got down.

Here was a pretty plight! The marooned men, having lost most of their provisions, stood every chance of freezing to death, especially as a further blizzard might come on at any moment and cut them off from the main body for days. Rescued they must be, and Norton determined to undertake it immediately. Once more he gave the order for all porters to descend to lower camps, while three grim men—Mallory, Somervell, and himself—stayed on until the early morning light should

130 Modern Exploration — Stories

enable them to see their way up the cliff. At considerable risk to their own lives, they reached a spot near the marooned men. You must understand that this was on a very steep slope with at the bottom an abrupt drop of many hundreds of feet to the glacier below, the ice of the slope being mantled by snow in the most treacherous state.

Somervell led the way, cutting steps as he went, and "constantly stopping to lean his head on his arm and cough". In the meantime the others hung on to the rope, to pull him up should he slip. He advanced along the slope until he reached the rope's end, when there was still a matter of several yards between himself and the porters.

But they had to be got down. Despite his cough, he cracked jokes with them, to give them confidence. Thus encouraged, they ventured on the slope without a rope. The first two passed safely, but just as the second man came within Somervell's grasp the remaining two slipped "towards certain death", but pulled up on the very edge of the abyss, as by a miracle. The gallant Somervell did not lose his head. He got the second man out of the way, drove in his axe like a post, and tied the rope to it; then, using the rope as a support, cautiously went out as far as it would go, and, with outstretched arms, could now just reach the porters. He grabbed hold of them, and hauled them back to life. You may often see such happenings in a cinema studio; here was the thing in real life, with the gaunt precipices of Everest for a background.

There was now a second general retreat to Camp I. Defeated, but not dismayed, the climbers made fresh plans. Only fifteen porters—"The Tigers", they were dubbed—remained in sufficiently good condition to make another effort, but there were still seven of the

climbing party determined not to accept defeat. After a long discussion about oxygen, it was decided to make two successive efforts, each by a party of two climbers, supported by porters as far as possible; the remaining three Europeans formed a reserve for a final attempt if necessary. The base was once more to be the high Camp IV on North Pass, a place which was by now heartily hated and dreaded by all of them. They were forced at first to do without oxygen, as hitherto it had not been possible to get it up the Pass.

On 1st June, the first assault proper began. Mallory and Geoffrey Bruce started up from the Pass, and that same night the second party—Norton and Somervell—slept there. Odell, Irvine and Hazard were in reserve.

2nd June was so windy that the porters lost heart, and would not go on. In the effort to carry their loads, Bruce seriously strained his heart; and eventually he and Mallory had to return without having achieved anything of note. You may ask, why did they not attempt to rush the peak; but one cannot rush at the rate of twenty steps for one prolonged halt, while one coughs up blood and pants for dear life.

Norton and Somervell fared better, despite a heavy battering from the wind. They passed the first party as it was returning. They pitched their high camp on the east side of the ridge, so as to avoid a repetition of Captain Finch's terrible two nights there in 1922. This was at 25,000 feet. The two climbers and their four porters slept there. The next day one porter was left behind, but the remainder carried their loads, in ideal weather, up to 26,700 feet, where they established the highest camp that has ever been made. One of these men had badly injured his knee, yet persisted, with great gameness, until his task was finished. Despite gales, squalls, loose stones and rare air, not to mention

132 Modern Exploration — Stories

Somervell's terrible cough, victory now seemed in sight. The porters were sent back, and the climbers spent a comfortless night, waiting for the great day to dawn.

They started next morning at 6.40 a.m. The actual climbing offered no difficulty, but the pace grew slower and slower. As they passed above 27,500 feet, each step was punctuated by a pause, and by numerous deep breaths. With oxygen, success would have been certain; without it, they became steadily weaker. Finally, at about 28,000 feet, Somervell stopped, and Norton went on alone.

He was now quite close to the upper pyramid, though some 200 feet below it. Somervell sat and watched him for an hour, during which he did not ascend more than eighty feet. At last he also stopped. The height was 28,130 feet, the greatest that any man has ever climbed to, and remained alive. He felt that if he did reach the summit, he would never get down again. Absolutely exhausted, both men turned back reluctantly, and, a little after darkness, were relieved from Camp IV. Everest had triumphed again.

All was not yet over. The oxygen had arrived, and after some discussion Mallory and Irvine set out on a final effort, carrying cylinders. Meantime the remainder were in a sad plight. Norton went snow-blind during the night. For two days and a half he could see nothing; but it was necessary to get him down to the relative comforts of the Base. This was accomplished by Hingston and Hazard, who guided the blind man's steps across the deadly ice-cliffs of the North Pass by a magnificent piece of work. Bruce, too, was quite exhausted, and had been forbidden to climb again. Somervell's plight we already know.

It is a singular thing that in each of the attacks on Everest the second climb was the best, and the third

disastrous. Mallory and Irvine, with Odell in reserve, left Camp IV on 6th June, safely reached the high Camp VI, and were seen by Odell, at ten minutes to one, on the afternoon of 8th June, climbing steadily up the base of the final pyramid, with about 800 feet still to conquer. They were then about 100 feet higher than Norton had attained. A passing storm shut them out from Odell's view, and though he looked afterwards, hard and often, he could not find them. He waited, in much anxiety, for a long, long time; and when a day had gone, and they had not returned, he went up to the last camp, but they were not there. Either they had stopped, exhausted, on the high peak, and had been frozen to death, or they had slipped and fallen to their doom. No trace of them was found, nor could a proper search be made, owing to the lateness of the season, the vast extent of the mountain, and the weakness of the other climbers.

This crowning disaster closes the attack on Mount Everest. All that is mortal of two brave men lies up there, near the summit of the highest point on earth—a fitting burial-place for such gallant hearts.

Yet if Englishmen are English still—and they are not likely to have changed since 1924!—the mystery will not be allowed to remain a mystery, nor Everest to rear his proud head unconquered. So far, the fight is to the mountain, but man will certainly win in the end.

CHAPTER X

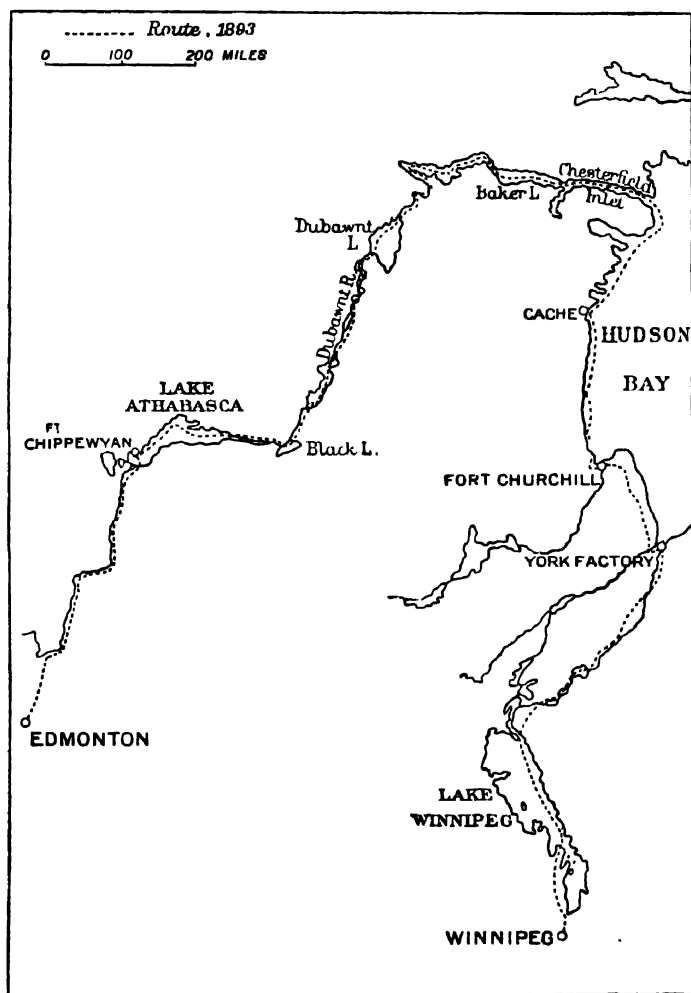
With Geologists in Northern Canada and Alaska

The constant search for valuable metals, especially gold, silver, copper, nickel and tin, has furnished many young and ardent scientists with the pretext for adventurous journeys into the wilds, frequently involving a good deal of hardship; for the precious metals nearly always occur in remote places—in deserts, high up on barren mountain-sides, or even in the realms of eternal frost. To give only one example; the famous gold-bearing gravels of Klondyke are frozen solid, although 200 feet or more beneath the surface, and they have to be mined by means of steam jets before they can be got to the light of day. A prospector's life, therefore, is a very rough one, and although he is always on the verge of making a fortune by some lucky discovery of a rich mineral vein, the elusive goddess leads him many a dance and deals him many a sly knock ere his efforts are rewarded.

Particularly is this the case in Canada, a land almost as large as Europe, and full of untapped mineral resources, but so sparsely peopled that only in the south, where the railways run, are roads, towns or civilization to be found. The immense region surrounding Hudson Bay will furnish ground for prospectors to search during many a decade to come; indeed, except for a few fur-

trading posts, a few settlements of Red Indians, and one or two small ports on the coast, it is still almost as desolate as it was in the days of Columbus. As one travels north, braving the cold winds that blow up from Hudson Bay, the massive forests, that make land journeys so difficult farther south, thin out; the trees become smaller and die away in creeping growths of willows and birches, and only a vast hummocky plain remains, the haunt of the reindeer and the temporary home of a few miserable Eskimos. Yet one day a gold mine may be found there, or an immensely rich field of silver or nickel, repeating the history of mining farther south; and then, railways will reach the place, trade goods will be carried there, and human beings will somehow contrive to live there on the few poor vegetables that summer frosts may spare, and a liberal allowance of tinned food! It is to events in this region, during about six months of the year 1893, that I invite your attention.

The district is mapped now, at least approximately, but at that time the whole area north of Churchill River and east of Athabasca River was absolutely unknown, except for a strip of Hudson Bay shore. Dr. J. B. Tyrrell, a member of the Canadian Geological Survey, proposed to remove this blot from the map, with no other aid than his instruments and a rough sketch made from the random recollections of an old Indian canoeman who had been some little way into the northland thirty years before. For companions he chose his brother, Mr. J. W. Tyrrell (who was to do the mapping and to serve as Eskimo interpreter), and six Iroquois Indians to paddle the canoes. There were three canoes, two of them eighteen feet long; and since the little party of eight would be absolutely dependent upon what they could shoot for fresh food, as large a parcel of supplies as could be stored was taken with them. For fuel they depended



Map showing route of Dr. Tyrrell's expedition

at first upon the illimitable forest; later they hoped to get dry reindeer moss, with an occasional twig from some Arctic birch.

You may have noticed that all this part of Canada contains a wonderful number of lakes of every conceivable shape and size. The same thing occurs in Scotland, in the Island of Lewis, in Finland, and in Sweden. Thousands of years ago all these places groaned beneath a huge ice sheet, like those which still cover Greenland and Antarctica, and when the ice melted water filled every hollow and created these lakes. Most of the old watercourses had been obliterated by sand, mud, and stones, so that the lakes were forced to drain into one another in the most irregular fashion, the water just spilling over and making a channel for itself as it flowed.

Thus if you want to travel at all in this part of Canada, you must proceed by water. Even then it is not easy, because the rivers are mere strings of rapids, not infrequently broken by beautiful waterfalls. At one moment a craft may be in comparatively still water, the next it is caught in the embrace of a current; faster and faster flows the stream, until it is turning round in foam-flecked circles and then it reaches submerged rocks over which it boils and fumes like a mad thing. Usually no boat can pass such places. There being a complete absence of roads, one must land at the most practicable point and push through the forest, carrying everything round the obstruction, only to find, after a short stretch of calm lake, a fresh rapid and a further spell of hard work. For these reasons almost the only craft used is the canoe, for its lightness enables it to be easily carried past rapids or falls. Every such spell of land transport is called a *portage*. To go a whole day without three or four portages would be accounted remarkably good luck.

Dr. Tyrrell's expedition had a vast distance to travel

138 Modern Exploration — Stories

before it could even begin its proper labours, for it was necessary to take train to Edmonton, near the Rocky Mountains, and then to be transported by road to Athabasca Landing, where the canoes were floated on the river of that name. A long and uneventful journey followed to Athabasca Lake where the Hudson's Bay Company had a fur-trading post, Fort Chippewyan. This was the region where the once-formidable Chipewyan Indians dwelt, but now it was so far civilized that the provisions for the expedition were taken thither, down the Athabasca River, in a paddle steamer.

In these preliminary journeys a month had been spent since leaving Edmonton, and they could not start from the fort until 20th June, 1893. This, however, was quite normal for the latitude, Lake Athabasca, like the other great inland seas of the Mackenzie, being ice-covered in winter and not clear until June.

Bidding adieu to civilization, such as it was in that remote spot, they spent a week mapping the north shore of the lake and collecting rocks. They travelled at first due east, but after a short while arrived at Black Lake, which the Doctor had discovered only the year before. For many days thereafter the way lay due north, and until 16th July they had to struggle against the currents and rapids. Crossing a swampy water-parting about $1\frac{1}{2}$ miles wide, they found the source of another river (afterwards named the Dubawnt), which led, by the usual rapids and long arrow-like lakes, to a very large lake (Lake Dubawnt) which was almost full of ice. This involved another sixteen days.

During the whole of this period one day was much like another. A description of the first, therefore, will suffice for all.

Immediately after leaving Black Lake they crossed six small lakes, with a rapid before each; six times was



DR. TYRRELL'S PARTY ON DUBAWNT LAKE

From a photograph taken by Dr. Tyrrell in 1893. Reproduced by kind permission of the Geological Survey, Canadian Department of Mines, Ottawa

it necessary to unload the canoes, to carry them along the slippery shore, passing masses of spruce trees that crowded almost to the edge, to load up again, and to make sure that nothing had been lost *en route*. Meantime, distances had to be noted; the angles of projecting peninsulas or prominent hills carefully measured; the strength of the current observed; the rocks closely scanned for signs of anything out of the common. Mostly it was a reddish rock, like granite, that they encountered; but many other kinds appeared from time to time. At some suitable spot it was necessary to pull up the canoes; to have a little welcome limb-stretching along the strip of shore; to make a fire and cook a meal, meantime enduring assaults from hordes of inquisitive mosquitoes which only the smoke from green wood could keep even passive. As night drew in and the cold northern sun retired behind the dark green silent trees, watch must be made for a suitable camping-ground, and when this was found, the tents were erected, a fire got burning, and a warm supper prepared. Then a few yarns, a few yawns, and the deep breathing of the sleeping men, oblivious to everything, including the distant howling of wolves.

This was a romantic life, though withal an arduous one. What the Red Indians thought of it is questionable; not many years had elapsed since they owned the forest, the prairie, and the streams; roamed, trapped, fought there as they pleased; and now, crushed beneath the white man's heel, they were reduced to paddling his canoes in order to exist! However, though by nature taciturn and never inclined to work more than is necessary, they act well when treated well, and Tyrrell knew how to handle them.

As the little party pushed slowly northwards the forest fell away; clumps of trees of any size became

140 Modern Exploration — Stories

sufficiently notable to need special mention; and the hateful mosquitoes gave place to a still more hateful plague of black flies. In places the country was very beautiful, bright green meadows stretching down to the lakes, with masses of cranberry and other low bushes, and with a varied array of flowers. Looking below the surface, however, the explorers found a mat of yellow moss, and only a foot or so down was bright clear ice! Such alternations of moss, mud, and ice may occur downwards for many feet. Frequently the bare rocks were brightly polished and scored with a hundred grooves, the mark of the old ice-sheet, while at intervals serpentine lines of low hills wound along the shore, like artificial ramparts. These last were made by rivers that once flowed beneath the ice.

Some of the lakes were many miles long, and occasionally they were wide. This necessitated much searching for the proper outlet; while to cross a wide deep lake in the frail canoes was always perilous, because of the common occurrence of sudden squalls. Once or twice, in fact, they were forced to camp, the strong winds creating such a sea that the canoes could not live in it.

For more than a month they saw no game. The inroads of eight good appetites had removed most of the provisions, and things were looking serious when, on 29th July, they descried on the eastern shore of Carey Lake an immense brown patch; it moved, and presently resolved itself into tens of thousands of reindeer. Cautiously paddling along under shelter of the bank, they seized their rifles and suddenly appeared among the frightened beasts, and before the reindeer had time to scurry off sixty-eight of them lay dead on the plain. They were, however, in very poor condition, for the lot yielded less than three hundredweights of dried meat. The process of cutting up and drying took until 2nd

August. Meantime Tyrrell mounted the only hill in the vicinity and planted the Union Jack there.

By 6th August the Indians were beginning to grow seriously alarmed. They were a long way north even of Black Lake, itself a considerable distance from any Indian or Canadian outpost. Before them stretched a great lake, thirty miles or more wide and eighty miles long; the mists which enshrouded it heightened the impression of its vastness, and its still ice-covered surface augured ill for the future. Evil spirits dwelt in the north; winter, moreover, was close at hand.

Nevertheless Tyrrell forced them to go on. He was determined to see whither his river should lead, even if it carried him down to the Arctic Ocean. Struggling along a narrow lane of open water, near the western shore, they came, after eleven days, to the outlet; during all this time they were rarely free from cold rain squalls or dispiriting mists.

The next day they espied a solitary Eskimo encampment. After assuaging the fears of the little men, they gave them tobacco and gathered from them some slight information concerning their surroundings. By continuing the voyage for a few days they would be able to turn east and so reach Hudson Bay across a string of lakes; however, it was three hundred miles away, and provisions were running low. The stolid but dispirited Indians paddled on; the determined leader continued his observations and his collecting with unabated ardour; his brother took angles for the map as methodically as before; and yet all of them must have known that they were running with time a very fine race indeed.

A welcome interlude was now provided by the sight of two deer, which were pursued and killed. Camp being pitched at the mouth of the river, the meat was all boiled. It was now the 25th August.

142 Modern Exploration — Stories

As soon as they travelled east matters rapidly took a turn for the worse. Driving the canoes against fierce head winds, and sometimes forced to haul them up because of storms, they lost much time in trying to find the proper outlets of the successive lakes, all of which were provokingly broad. 2nd September found them still on the western side of the last large sheet that lay between them and Chesterfield Inlet. However, they were now back at a known spot. Whatever the future might hold in store, they had already successfully traversed more than 800 miles of totally unknown waterways, besides making valuable collections and an important map. The next day they killed another reindeer, but it was the last they were destined to see that year. Chesterfield Inlet they found to be a straight fjord up which wind and tide rushed against them with equal fury, so that they were nine days in getting the heavily laden canoes down to the sea.

At last, on 13th September, Hudson Bay came in sight, a boundless expanse of green water, its surface tossed into a myriad white horses. With a boat, the journey of more than 500 miles to York or Fort Churchill would be a trifle, but in their frail canoes they were certain to be the sport of every squall, and only by keeping inshore could they hope successfully to undertake the journey.

At first all went well. Three fine days placed them one hundred miles nearer home. The men, realizing that safety depended upon their own efforts, pulled with a will. Then their luck broke. A sudden storm caused them to run for shelter to a sandy islet, and its continuance forced them to stay there for a day and a half, although they were practically starving. When at last it cleared, they started afresh, but while crossing the mouth of an inlet a sudden squall placed them in great danger and they were only saved from drowning by the

providential appearance of a reef, behind which they obtained some shelter. So the struggle went on from day to day. Paddling, watching the sky, living on short rations, and being drenched by the waves that broke over their frail cockleshells, day after day for twenty days they journeyed, and in all that time they made only 120 miles of southing. September gave place to October; ice formed on all fresh-water lakes; the cold air intensified their hunger; the raw dampness of their surroundings made them all heartily miserable.

Nevertheless they had to keep a constant watch for anything which might serve as food, and to chase it to the bitter end when it appeared. Thus, on 25th September, the voyage was held up while a desperate land hunt for food took place; but neither Indian cunning nor European rifles could procure more than one small ptarmigan, which was duly divided among them. To add to their misery, for such food as they did procure they had no fuel during several days. The reindeer moss had been deeply buried by a snowfall, and the driftwood that usually litters Arctic shores was unaccountably scarce.

3rd October found them still 270 miles north of Fort Churchill. Some days before they had fortunately shot a bear, but only a little of its fat remained; they were still without fuel, and the nearest trees were 200 miles inland. Even the sea was against them, for the shore, which had been cliffy, now became a vast plain, barely above the tossing waters. Hence, at low tide a strip of mud several miles wide was laid bare, and the travellers could make the land only twice a day.

Once, indeed, they had the misfortune to be caught on the ebb, with the result that they spent a miserable night in the canoes, with the icy spray splashing over them. Soon the temperature descended below freezing-point throughout the day; ice formed on the paddles

and the salt water froze on the men's tattered clothes. A two days' struggle yielded only a miserable six miles. The journey home was resolving itself into a struggle for existence.

On 6th October Dr. Tyrrell decided to abandon everything that was not essential. Accordingly one canoe was dumped on the highest part of the shore, together with the mineral collections and the instruments. The two remaining canoes now had only to bear the tents and blankets, guns and ammunition, besides their human freight.

For another ten days the little party struggled on, never either wholly out of the water or wholly in it, and all the time practically starving. One Indian developed frost-bitten feet, another had dysentery, and at last it became imperative to camp on dry land, even though they were now but two days' journey from the fort. The brothers foraged for food and luckily shot some ducks. This was the first food any of them had had for thirty-six hours. They returned to the tents and two Indians were sent forward to Churchill for relief. Three weary days of waiting passed, and then the Indians returned, accompanied by a dog-sledge bearing food. The worst was now over.

However, they were still not quite out of the wood, for they were almost a thousand miles from Winnipeg—a considerable journey even in that land of vast distances. Fort Churchill was gained on 19th October, but they were forced to stay there until 6th November, recruiting their strength. At last it became possible to cross the wide mouth of the Churchill River, and they set out on the short journey to York Factory, where medical attention and all their wants could be supplied. The Indian with frozen feet was hauled on a dog sledge; the others pulled their belongings on toboggans. A seven days'

crossing of the snow-covered country brought them to the estuary of the Nelson River, York Factory being on the opposite shore. Imagine their dismay at finding the river running like a rapid, choked with masses of floating ice, and absolutely impassable, either by canoe or on foot!

There was nothing to do but to sit down and wait. They pitched their tents and spent the time in hunting foxes or anything else that might replenish their scanty larder. There they remained ten whole days. At last, however, it became practicable to cross; the weary travellers stumbled into the Factory, and their trials were at an end.

Their trials, but not their task. It was 24th November now, deep in the grip of a Canadian winter. Four days later the Tyrrells set out once more, this time bound for Winnipeg; but although they travelled continuously by sled and snowshoes, across country and over the vast level ice of Lake Winnipeg, 2nd January of 1894 had dawned ere they reached their goal.

This exploring journey was exceptional in the hardships which its later stages involved; yet it is otherwise quite typical of many that have been made by the hardy pioneer geologists and surveyors of the Canadian Government.

As to the explorer who endeavours single-handed to penetrate those lonely wildernesses, or the poorly equipped and inexperienced prospector who is attracted there by the magical illusion of an easy fortune, many are the tales of terrible hardships suffered by such men; yet every year some are found who will brave the dangers for the sake of gain.

Very different is the history of Mr. Ernest Leffingwell, an explorer who, for sheer love of his work, spent nine summers and six winters on the north coast of Alaska—

146 Modern Exploration — Stories

a still more inhospitable spot, if that were possible—much of his work being done alone under very remarkable and Crusoe-like conditions.

As a young man Mr. Leffingwell was seized by the romance of the Arctic, and an early trip to Nova Zembla only confirmed his determination to do some notable work there.

He first went to Alaska in 1906, as joint commander of the *Duchess of Bedford*, a small ship under the captaincy of Mikkelsen, about whom we have already read. Their object was to see if any land existed north of Alaska, but the bad state of the ice frustrated their efforts. They were forced to winter at Flaxman Island, a dreary and absolutely featureless flat of tundra, lying off the coast. Investigation now proved that the vessel was unseaworthy, so the expedition broke up, the men returning home by whaling ships. Leffingwell, however, saw in all this the opportunity which he had been seeking. He determined to map all that dreary and little-known coast between Point Barrow and the Canadian frontier, and to make geological surveys up one of the chief streams—the Canning—to the Arctic Mountains. Accordingly he stayed behind on Flaxman Island, having first had a stout hut constructed there, out of the timbers of the ship. Here he lived, on and off, until 1914, having, by minute attention to detail, rendered the place tolerable, even when a gale was raging outside and the temperature in the open was eighty degrees beneath freezing-point.

The surroundings were not inspiring. Beyond the flat island lay an equally flat and barren plain in which even mounds were noticeable features. As a background, the sharp points of a mountain ridge glittered with ice, but they were often invisible because of the constant mists that enveloped the coast and everything about it.

Leffingwell's very beginning was typical of the man.

Originally he was not a practised surveyor, so that "for the large-scale detailed map, the whole subject had to be mastered from the beginning". A class-room on Flaxman Island, with the wind howling outside, and only the light of a kerosene lamp to read by, is not to be recommended to anyone other than an enthusiast for his work.

In 1908 Leffingwell returned to the United States for supplies that his experience had shown to be necessary, and in 1909 he was back again at his work. This time he stayed there until 1912. In order to raise funds, he took two other whites with him, and one summer attempted a little whaling, without, however, making any captures. One of the men, Samuel MacIntyre, became attached to him, and stayed on; but after three years even he took his departure, and with him went the yawl, in payment of his wages.

Leffingwell was not discouraged. Isolation, apparently, left him quite indifferent. The work went on, and when it was finished he obtained a passage back by whaler and U.S. revenue boats. To realize what his isolation was, one must remember that the only help he could call upon, in the event of sickness or accident, was some twelve men in all, scattered over several hundreds of miles of Arctic shore. The long winter night, when it was a misery to be out-of-doors; the howling gales, so fierce that his windows had to be double-paned to prevent their being blown in; the snowstorms, the canned food, and the absence of human voices, affected him not a bit.

At intervals he engaged the services of Eskimos, but they would leave him whenever they saw fit, and even his mountain trips had to be sometimes undertaken alone. For his coastal work he used a dory, or an Eskimo canoe. For his land journeys he had a dog team and a sledge. He camped out in an Eskimo tent made of some twenty

148 Modern Exploration — Stories

thin willow rods, each eight to ten feet long, bent over into an arch about four feet high, and thrust into the ground. Over this hemispherical frame a silk fabric is drawn tightly, the ends being held down by beaten snow. If the load on the sledge was too heavy, the fossils or furs had to be buried and a fresh journey made to fetch them. If anything required mending or replacing, he had to do it himself.

Despite all this, his work will always rank as a fine piece of individual exploration. The Royal Geographical Society gave him a highly-prized medal for it, four or five years ago, which was, I suppose, the first intimation that most people had of his existence, so modestly and quietly had he gone to work.

Afterword

The last of my brief tales was ended. I had shown our budding Stanley (at least, I thought I had) that an explorer's life is not a bed of roses. Incidentally, I had convinced him, after some argument, that pluck and endurance are not the peculiar property of the English race, although we have a distinctly large share of them.

"And I hope you will agree," added Tom's father, who had been present at most of our little talks, "that it is the very last thing in the world you're suited for, and that you had better get into an office, where it is safe."

"Not at all," said the young rogue stoutly. "On the contrary, I am more determined than ever to try this exploring life. When can I start?"

.
At present, I regret to say that I am not on visiting terms with Tom's parents.

Appendix

The following brief notes concerning the careers of some of the principal travellers whose exploits figure in these pages may be of interest to those who desire to know a little more about their heroes.

The figures inserted between brackets refer to the publications of the Royal Geographical Society, in which the explorations mentioned are described; the plain heavy figures referring to volumes of the *Geographical Journal*, while the prefix "P" means that the volume is one of the *Proceedings* of the Society. The *Geographical Journal*, which was first published in 1893, can be procured at many public libraries.

In addition to the articles thus referred to, most of the famous travellers have published books describing their work, besides elaborate and often massive accounts of the scientific results.

Sven Anders Hedin was born at Stockholm on 19th February, 1865. The son of the Stockholm Chief Architect, he was educated in Sweden and Germany, and as a boy displayed a remarkable interest in maps and Arctic travels. In 1885-6, when only 21, he made a journey to Persia and Mesopotamia; accompanied an embassy to the Shah of Persia in 1890; and one year later reached Khorasan and Turkestan. During this trip he ascended the high peak, Demavend. His first great Asiatic journey occupied the years 1893-7. He passed from the Sea of Aral through Turkestan to Kashgar; made the desert crossing recorded herein; made a wonderful map of the Mustagh Pass region; crossed Tibet; and ended up at Pekin (11, pp. 240-58, 397-415. 1898). As a result of this, he acquired great renown, no less for his daring than for

the extraordinary detail of his mapping, and the size and completeness of his collections. Literally nothing escaped him. No sooner were the results worked out than Tibet again called him; and from 1899-1902 he wandered through the Tarim and Gobi Deserts, enduring much hardship, but making an invaluable study of desert features. He was made a Swedish noble in 1902. The results of this journey surpassed those of the last (20, pp. 307-15. 1902). His last great journey, again to Tibet, took place in 1906-8. He discovered the source of the Brahmaputra, and almost reached Lhasa, but was turned back. Among other things, he added several new mountain *ranges* to the map (33, pp. 353-439. 1909).

Although he had to deal with numerous robbers and with constant opposition from the Tibetans, he never shed blood, but his life was frequently in danger. He displayed a great fondness for animals, especially his dogs, and his humanity proved one of his finest traits. He is a splendid linguist, and, like Nansen, no mean artist in water-colours. He has written many books, some of which have had a world-wide circulation.

Sir Aurel Stein, who was knighted in 1912, is a naturalized Englishman, of Hungarian birth, born at Budapesth on 26th November, 1862. He studied Oriental languages in Vienna and London, and then went to India, where he was a professor at the Oriental College of Lahore for about eleven years. The Indian Government sent him on an archæological research into Chinese Turkestan, especially round the buried cities of Khotan, in 1900-1 (20, pp. 575-610. 1902). Here he made valuable discoveries of manuscripts and ancient relics, besides doing important surveying. A similar but much larger expedition occupied the years 1906-8 (34, pp. 5-36. 241-270. 1909). He made another great journey with the same objects during 1913-6, in Persia; and a fourth, into Baluchistan, in 1926-7.

Sir Francis Ernest Younghusband was born at Murree on 31st May, 1863. The second son of a distinguished soldier, Major-General Younghusband, he was educated for the Army and joined the 1st Dragoon Guards in 1882. His great facility for dealing with the wily and yet simple Asiatic potentates has procured for him a constant succession of Government posts, as Consul and Resident or Commissioner, in the countries

surrounding India. His first great journey was the one which we have already followed; but in 1889, and again in 1890-1, he was again in the desolate Pamir and Hunza countries. His most notable geographical expedition, however, was the Tibet Mission, 1903-4, a military expedition which entered Tibet despite opposition and marched to Lhasa. As a result of Younghusband's efforts the Dalai Lama became more friendly to British enterprise. Many years later this bore fruit when, in 1919-21, efforts were going forward for the exploration of Mt. Everest, Younghusband at that time being President of the Royal Geographical Society.

Joseph Thomson was born on 14th February, 1858, near Thornhill, Dumfries-shire. He early developed a love of geology and the allied sciences, and in 1878, although not yet 21, was accepted as geologist in the Royal Geographical Society expedition under Keith Johnstone, to explore the Central African lakes. After five months there, the leader died, and Thomson carried out the expedition alone, particularly examining Lakes Tanganyika and Nyasa (*P.*, 1880, pp. 721-42). He returned home in 1880, but the next year (July-September, 1881) was again in Africa, seeking for coal on behalf of the Sultan of Zanzibar. No coal was found, but some useful geographical data came to light (*P.*, 1882, pp. 65-79). In 1883-4 his third expedition, recorded in these pages, took place (*P.*, 1884, pp. 690-712). In 1886 he was back again, this time in Sokoto and the Sudan, on a political mission, and in the same year occurred his expedition into Morocco. Africa drew him as a magnet attracts the needle; 1890 found him there for the fifth time, this journey being to the Upper Zambesi and the wilds of Lake Bangweolo. The constant hardships of his wandering life brought on a long illness, from which he died on 2nd August, 1895. He was only 37, and was one of the finest characters who ever ventured into the realms of African savagery.

Boyd Alexander, Lieutenant in the Rifle Brigade, had many points in common with Joseph Thomson, and, like him, met an untimely death at the age of 37. He was born in Kent, of Scottish descent. He developed a great love for bird study and collecting, and made numerous shooting trips, both in East and West Africa. He took part in the relief of Coomasie

in 1900. In 1904 started the great journey to which we have devoted a few pages; for this he received the Founder's Medal of the Royal Geographical Society, the highest honour they have to bestow (30, pp. 119-51. 1907). In December, 1908, accompanied by the collector Lopes, he left England for West Central Africa; explored several islands, mainly for birds; and in March, 1909, ascended the highest summits of the Cameroons Mountains. He then travelled north to Lake Chad, the scene of his former exploits, and had some idea of penetrating through Wadai and Darfur. But the country was up against the French; Alexander was surrounded by a mob on 2nd April, 1910; an effort was made to drag him forcibly before a local sultan; and when he resisted he was murdered. Lopes escaped to tell the tale. Thus died one of the most determined of African explorers.

Lieutenant-Colonel P. H. Fawcett was born at Torquay in 1867. Educated for the army, he joined the Royal Artillery in 1886, saw much service in various parts of the world, resigned his commission in 1910 in order to continue his South American work, rejoined in 1914, and served through the War. He received the D.S.O., and was four times mentioned in dispatches.

His South American explorations began when, in 1906-10 the British Government loaned him as a surveyor to the Bolivian Boundary Commission, and during that time occurred the exploit we have recorded. He returned to his old love in 1919-22, bent on solving some of the many mysteries of that remarkable region. His probable sad fate has already been noted (35, pp. 513-31. 1910. 37, pp. 377-97. 1911).

Fridtjof Nansen, the son of a distinguished Norwegian advocate, was born at Oslo, 10th October, 1861. He received a considerable scientific training. He made an early voyage to the Greenland Sea in 1882. His celebrated crossing of Greenland took place in 1888-9 (*P.*, 1889, pp. 469-86). This was followed by the still more famous Polar journey, 1893-6 (9, pp. 473-505. 1897). For some time thereafter he was a Professor at Christiania University, but his restless inquiring spirit always prompted him into new paths. He accomplished a journey along the Arctic coast of Siberia, made several researches of the highest value in the Norwegian Sea, and was

one of the prime movers in forming the International Council for the Study of the Sea. He has frequently resided in this country; was Norwegian Minister here from 1906-8; and received the honour of G.C.V.O. In recent years he has been much concerned with famine relief work. For manliness, ability, and strength of character Nansen has no superior, and few equals, among modern explorers.

Sir Douglas Mawson has been for many years Professor of Geology at Adelaide University. He is a Yorkshireman, born at Bradford on 5th May, 1882. He was educated in Sydney, and took up geology as his life study. He accompanied Shackleton's famous voyage in the *Nimrod*, 1907-9; ascended Mt. Erebus, and penetrated to the South Magnetic Pole. In 1911-4 he led an expedition of his own, the Australasian Antarctic Expedition, when the adventure befell him which we have noted. During the Great War he served in the Army. In 1929, at the age of 47, he organized yet another expedition into the Antarctic.

Captain Einar Mikkelsen has had a most adventurous career, even for a sailor. The son of a Danish Government inspector, he was born on 23rd December, 1880. At the age of 14 he went to sea and travelled all over the world. He was selected to accompany Amdrup's expedition to East Greenland in 1900, a country with which, as we have seen, he afterwards became painfully familiar. In 1901-2 he was again in the Arctic, this time in Franz Josef Land, while from 1906-7 he was with Leffingwell in another sector of the same frozen ocean. His long sojourn in North-East Greenland during 1909-12 would have sickened most men of the country (33, pp. 40-64. 1909. 41, pp. 313-23. 1913). Nevertheless, he has been there again since the War, having visited Scoresby Sound in 1924.

Sir Ernest Henry Shackleton was an Irishman, born at Kilkee on 15th February, 1874. He was educated at Dulwich College, subsequently entered the Merchant Marine, and became attached to the R.N.V.R. In 1901 he joined Scott's great *Discovery* expedition to the Antarctic, edited the first polar newspaper, *The South Polar Times*, and accompanied the leader on his southern sledge journey which attained the then farthest south. On the way back he broke down and was

sent home by Scott. In 1907-9 came the *Nimrod* expedition, when Shackleton greatly extended Scott's discoveries. As a result of this he was knighted. In 1913 he began to prepare for another Antarctic adventure: the *Endurance*, a vessel of remarkable strength, was built specially, and she sailed three days before the outbreak of the Great War. Shackleton at once offered to throw up the whole expedition, but was told to go on. The fate of the *Endurance*, and the masterly way in which the leader extricated his men, have already been described. By the generosity of an old schoolfellow, Mr. Rowett, Shackleton was enabled to finance the *Quest* expedition of 1921-2, to explore the remoter islands of the Southern Ocean. He died suddenly on board on 5th January, 1922, at the age of 48; and was buried under the snow-covered hills of South Georgia, within range of the continent where his best years had been spent.

TRIUMPHS

To
My Son

Foreword

Thirty years ago, or even less, any young man with a bent for travel and adventure had a generous range of unknown lands in which to wander. He might attempt the Antarctic, a mysterious region, and practically untrodden by the foot of man; or if the other Pole attracted him, he would have the inspiring example of Nansen (the *Fram's* drift across the frozen ocean being only four years old), while the uncompleted labours of Peary would leave him ample scope even in Greenland. If our budding Stanley preferred heat to cold, a dozen places in darkest Africa called for exploration and mapping; from the unknown depths of the Congo forests, with their pygmies and other savages, to the vast expanses around Lake Chad, the home of the cannibal, the slave-dealer, and the malaria mosquito. If, fired by the work of Sven Hedin and Doughty, deserts tempted him, then there was room and to spare in the stony wastes of Libya, Tripoli, Arabia, and Mongolia. If he elected to go East, then the waving palms of the New Guinea flats formed a green barrier behind which all was mysterious, savage, and totally unknown. If he went west, he would find on the Amazon many tributaries which had never been properly mapped, while even in Canada immense regions had scarcely been touched.

Fourteen years later, when the Great War broke out, one of those waves of exploration which occur periodically had removed most of the principal blanks from our maps. In 1909 Peary had realized his heart's fondest hope, by attaining the North Pole; in December, 1911, Amundsen reared his flag upon the frozen plateau of the South Pole, and one month later Captain Scott followed him. The British flag had also flown

in the "unattainable" city of Lhasa, and now Tibetan gentlemen even sent their sons to be educated at English public schools. Up and down the Andes, in and around the Himalaya, industrious and venturesome parties climbed, mapped and collected, steadily circumscribing the unexplored wildernesses. Sven Hedin and Stein had covered much of Central Asia with the network of their routes; and even more had been done in the same direction by Kozloff, Pevtsoff, and other Russian travellers. Boyd Alexander had crossed from Lake Chad to the Nile, and had just lost his life in a second venture there. Several great expeditions had learned as much about New Guinea as it was practicable to learn at that time. In a word, this was the period, *par excellence*, of successful exploration.

I invite you to look with me at the work of some of these Edwardian explorers; to share in a few of their hardships, to understand their disappointments, and to share in their joy at their achievements.

Such a series of excursions as is now proposed is the more fascinating since, although many of the actors are still living, they belong to an age which is just passing away; indeed, between the world of to-day and that of "before the War" an enormous gap intervenes, a gap that one cannot measure in years. Acroplanes and an airship have crossed the North Pole, with no more fuss or preparation than a normal or ground exploratory party would make in going from London to Lapland. Sir Hubert Wilkins and Commander Byrd have transferred the same methods to the Antarctic, where they have done more rapid or reconnaissance surveying in a short season than ground methods could have achieved in a decade. Dr. Hamilton Rice, employing a hydroplane, and getting his times for longitude observations by wireless, has surveyed a great extent of the Amazon tributaries which was formerly entirely unknown. Mr. C. W. Andrews and his coadjutors, with caterpillar cars (the commercial outcome of the tanks) has swept countless cobwebs off the Mongolian deserts, enabling large parties to be employed, and more work to be done in a season than would have been credible before the War; while even in the dreary wastes of the Libyan Desert and beyond, Hussanein Bey, Ball, Beadnell, and others have successfully employed cars in the traditional places where formerly only camels could be used. The explorer,

therefore, must be equipped to-day with a good knowledge of mechanical and physical science, besides his purely exploratory qualifications; and no matter in what guise he goes forth into the unknown, he can calculate his hazards with a certainty which was impossible to his predecessors, and thereby he loses that extra spice of adventure which fell to their lot.

Of course, exploration is not confined to the land, since two-thirds of the earth are covered by the ocean; but for many reasons the exploration of the sea and such things as are hidden beneath its restless surface has lagged far behind that of the land. In order to convey some idea of how the mysteries of the deep have been partially plumbed, this book contains an outline of the life story of that remarkable man, Sir John Murray.

For the facts contained in these narratives the author is chiefly indebted to the writings and lectures of the travellers concerned. In particular, the following have been specially drawn upon:

Dr. Sven Hedin, "Journeys in Tibet, 1906-8", *Geog. Jnl.*, 33, 1909; Gen. J. T. Walker, "Four Years' Journeyings through Great Tibet", *Proc. R.G.S.*, N.S., 7, 1885; St. G. R. Littledale, "A Journey Across Tibet from North to South", *Geog. Jnl.*, 7, 1896; Sir F. Younghusband, "Geographical Results of the Tibet Mission", *Geog. Jnl.*, 25, 1906; P. Landon, *Lhasa*, 2 vols., 1905; H. Whitely, "Explorations in the Neighbourhood of Mts. Roraima and Kukenam", *Proc. R.G.S.*, N.S., 6, 1884; E. im Thurn, "The Ascent of Mt. Roraima", *Proc. R.G.S.*, N.S., 7, 1885; J. Brown, "Expedition to Kaieteur Fall, British Guiana", *Jnl. R.G.S.*, 1869; Sir John Murray, "Challenger" Reports, *Summary of Results*, 2 vols., 1895; Sir Wyville Thomson, *Voyage of the "Challenger"*: I, *The Atlantic*, 1877; Sir John Murray and J. Hjort, *The Depths of the Ocean*, 1912; R. E. Peary, "Explorations in North Greenland", *Geog. Jnl.*, 11, 1898; *id.* "Four Years' Arctic Explorations, 1898-1902", *Geog. Jnl.*, 22, 1903; *id.* *Peary Arctic Club Expedition to the North Pole*, 1910; I. C. Russell, "Second Expedition to Mt. St. Elias, in 1891", *U.S. Geol. Surv.*, 1893; H.R.H. the Duke of the Abruzzi, "Expedition to Mt. St. Elias", 1898; *id.* "The Snows of the Nile", *Geog. Jnl.*, 29, 1907; F. de Philippi, "Expedition of H.R.H. the Duke of the Abruzzi to the Karakoram Himalaya", *Geog. Jnl.*, 37, 1911; Lt. W. E. Stairs, "Ascent of Ruwenzori", *Proc. R.G.S.*, N.S., 11, 1889; F. M. Bailey, "Journey through a portion of S.E. Tibet

and the Mishmi Hills", *Geog. Jnl.*, 39, 1912; *id.* "Exploration on the Tsangpo or Upper Brahmaputra", *Geog. Jnl.*, 44, 1914; A. Bentinck, "The Abor Expedition: Geographical Results", *Geog. Jnl.*, 41, 1913; B. E. A. Pritchard, "A Journey from Myitkyina to Sadiya" *Geog. Jnl.*, 43, 1914; Th. Thoroddsen, "Explorations in Iceland", *Geog. Jnl.*, 13, 1899.

CHAPTER I

In and Around Lhasa, the Forbidden City

To some people the sign "Trespassers will be prosecuted" is a direct invitation to climb over the fence. Such persons are not necessarily born explorers—they might be merely poachers!—but they have at least one exploring instinct, the desire to penetrate into that which (because it is hidden) is mysterious.

Perhaps the best instance of this in records of travel has been the incessant endeavour to get to Lhasa, the chief city and holy place of Tibet; an endeavour that has almost invariably been thwarted by the prejudices and ignorant opposition of monks or lamas.

Besides its three great monasteries Lhasa contains a huge golden image of Buddha; its unpaved streets are trodden daily by pilgrims and monks, all indescribably filthy, vacant of gaze, and muttering the inevitable Buddhist expression, "Om mani padme hum"; and as the sanctity of the city rested upon the rigorous exclusion of unbelievers, the one aim of the lamas for centuries has been to keep it undefiled by foreign footsteps.

Lhasa stands in a secluded valley a short distance north of the Sanpo, or Brahmaputra, the great river of Tibet. It is within 200 miles, in an air line, of Sikkim, that northern projection of India which is sandwiched between the buffer states of Nepal and Bhutan. A trade

166 Modern Exploration — Triumphs

route passes along this road; and it was also used by the British Mission to Tibet in 1903-4. Ordinarily, however, the Government of India refused explorers permission to cross the frontier; so that they had either to pass round the western end of the Himalaya 1200 miles away, or else enter Tibet from the still more remote countries of Turkestan or Mongolia.

Although founded more than 1000 years ago, and long renowned for its temples, with their glittering roofs and golden idols, Lhasa remained unseen by Europeans until 1662, when two Jesuits, Grueber and Dorville, carried their creed thither; these men were followed by others in 1716. The Capuchin monks also established a mission there in 1708. None of these enterprises prospered, and eventually all foreigners were once more excluded. The great statesman of our early rule in India, Warren Hastings, made attempts to open up a trade with Tibet by way of Sikkim; but his ambassadors, George Bogle and Samuel Turner, got no farther than Tashilunpo, on the Lhasa road, where they were received well enough, but were restrained from proceeding farther. In 1811, however, a remarkable Englishman, Thomas Manning, penetrated to Lhasa, where he stayed unmolested for some time. The barrier was then dropped again; and only once between Manning's time and 1904 did a white man visit the city: this was the Abbé Huc, in 1846.

Lhasa is ruled by a High Priest, the Dalai Lama, whose power is such that he really dominates the country. The frequent Regents, likewise the Chinese Viceroy and the Tashi Lama, are also important men; but the real power lies in the three great monasteries of Lhasa, with their thousands of unwashed, yellow-capped fanatical monks. All these authorities normally pulled against one another; in fact, the only thing that could unite them speedily was hostility to the foreigner.

This was the position in the early 'nineties of last century; when Tibet had for so long been a closed land that it had become a point of honour among explorers to attempt its penetration. So long as such adventurers kept in the remote northern or western provinces they ran no great danger, other than that arising from the loss of transport and the probability of starvation. Farther south, however, robber bands might pilfer them, and local headmen would be sure to try to thwart them, while on any of the main roads a whole army of scowling Tibetans would speedily bar their advance.

Governments also took a growing interest in the wild valleys and snowy passes of Tibet. For many years Russian expansion had been towards the east and south-east; and she had steadily swallowed up the independent states of Khiva, Bokhara, Merv, Samarkand, and Khokand. English politicians, and particularly English writers, loudly exclaimed that Russia was menacing India; with the result that a vastly greater interest arose in the countries bordering on India.

As Tibet was closed to Europeans other means had to be employed to glean something about the nature of the country, and what went on there. For this purpose specially trained natives were engaged. They were taught surveying in order that they might bring back maps; and were dispatched to Tibet, usually disguised as merchants, with orders to attach themselves to caravans, to survey the routes, and sometimes to do special tasks. Their instruments, of course, were hidden among their wares—Chandra Das, for instance, hid his inside a prayer wheel; while the observations always had to be taken by stealth, and usually under dangerous circumstances; for if detected the unhappy men were liable to death, or at the least, slavery. Prayer wheels, by the way, are cylinders bearing large numbers of the words "Om

168 Modern Exploration — Triumphs

mani padme hum ", written over and over again: the more numerous the words, the holier becomes the man who turns the wheel. The wheel has to be turned to the right; and in conspicuous places large ones stand by the roadside, with millions of these words inside them, printed on scraps of thin paper.

For measuring distances the native surveyors depended upon rosaries, which they carried in their hands; by this means they counted the paces from place to place. The mechanical work involved in thus measuring distances of 1000 to 1500 miles is immense, but it was done; and all things considered, a very fair idea of Tibet was obtained. One famous surveyor, Nain Singh, even stayed in Lhasa; another, A. K., spent the greater part of the year 1879 there. These natives, however, had no eye for anything beyond their specific instructions; they could keep scarcely any records; and the information they had procured was extracted from them mainly by judicious questioning after their return. Thus, every fresh journey only whetted the desire of their masters for more accurate data, i.e. more *facts*.

This inquisitiveness concerning Tibet was not confined to those most interested, the British and Russians. W. W. Rockhill, a learned American, made three separate attempts to get to Lhasa, armed with every sort of authority from China; but, approaching from the north, he was turned back long before nearing the capital. Two French travellers, G. Bonvalot and Prince Henry of Orleans, also passing from north to south in an adventurous journey across Central Asia, made a dash for the place in 1890, and were only pulled up when but a single mountain range intervened between them and the city's golden roofs. Four years later another Frenchman, the unfortunate Dutreuil de Rhins, while on a similar course, was attacked and thrown while still alive into a river

(probably the upper Yangtsekiang) and drowned. Many other men crossed Tibet from west to east, or vice versa; and so long as they did not venture too far south they remained immune. The two most troublesome people with whom the Tibetans had to deal, however, apart from Younghusband, were the indefatigable Sven Hedin and the iron-willed Littledale. Both of them got within striking distance of Lhasa, only to be turned back at the last moment. Littledale's famous journey, in 1895, was highly adventurous, and we will follow him now.

St. George R. Littledale was primarily a hunter of rare wild animals, especially the very shy Asiatic sheep, *Ovis poli*, and the wild camel; but with his hunting he combined surveying, and he always chose out-of-the-way places for his journeys. He had already had considerable experience of Central Asia, having twice crossed the Pamirs or high mountain valleys north of Chitral, besides making the long through journey from Turkestan to Peking. He knew to a nicety the wily ways, unending procrastination, cupidity, and childish cunning of the Oriental; and he went provided with a large supply of the sinews of war, i.e. money. This was carried in silver bars; and when his change ran out he had to have them chopped into small pieces by a local blacksmith.

With him went Mrs. Littledale and his fox terrier, both of whom had braved the exposure and risks of the region before. His nephew, Mr. W. A. L. Fletcher, a giant young man six feet six high, completed the party.

Thanks to Littledale's admirable faculty for getting on good terms with Russian officialdom the little expedition and its bulky baggage passed without delay across the huge Russian Empire, from the western shore of the Black Sea to the limits of eastern Turkestan. They travelled under the shadow of the jagged Caucasus; crossed the Caspian Sea in a crowded lake steamer; and

170 Modern Exploration — Triumphs

thence went, mainly by tarantass (a wooden cart), to Merv, Bokhara, Khokand, and Kashgar; then on to Yarkand, a great caravan mart, whence roads run to Kashmir on the south, Turkestan on the west, and China on the east. Only a few years earlier these names would have brought a thrill to one's blood; for the places were hornets' nests of brigands and half-wild petty chieftains, to whom murder was an every-day occurrence; and anyone who ventured thither certainly took his life in his hands. For instance, when Vambéry, the celebrated Hungarian Jew, visited Bokhara in 1863 he had to travel completely disguised; and even then his adventures were little less remarkable than those of Sir Richard Burton, who by similar means had penetrated to Mecca ten years before. By Littledale's time, however, all the principalities had been swallowed up in the strong embrace of Russia, and travelling had become as safe as is possible in a land where thieving instincts are so well developed. It is worth noting that this preliminary journey to Yarkand, involving the transport of all the most valuable portion of the baggage, amounted to 4500 miles.

Littledale's intention was to reach the high Tibetan valleys in the spring, when the scanty grass supply would be fresh and young; otherwise he would have been compelled to carry fodder for all his animals throughout, because during the colder months it is hard to detect a living thing there. Accordingly, the first part of the long journey took place during the bitter mid-continental winter. It was sometimes so cold that water poured into a glass froze ere it could be drunk.

While at Kashgar, they met a man who was destined to cause the Tibetans even more trouble than themselves, Dr. Sven Hedin, who was already well known for his desert journeys in Persia, Turkestan, and adjacent parts.

The Chinese authorities at Kashgar regaled the two explorers with a dinner, at which the following curious fare was provided: "Eight dishes of sweets, cut into small pieces; then followed sharks' fins, sea slugs, bamboo shoots, and numberless greasy dishes." The Asiatics of this part, like most races who are uncertain when they will get their next meal, are inexhaustibly greedy, and will speedily eat a whole sheep, continuing at the table long after the European has reached satiety.

From Yarkand, Littledale travelled eastwards for a long while on the Peking caravan road; crossing uninteresting wastes, with the huge dunes of the Taklamakan Desert on his left, and a mighty snow-clad mountain range, the Kuen Lun, on his right: the latter formed the northern battlements of Tibet, and sooner or later he would have to force a way across it. Finally he stopped at Cherchen, a town in the desert, where he engaged men who were supposed to know the way across the Kuen Lun. As supplies would henceforth be unobtainable anywhere, he also acquired 250 animals and numerous carriers, a flock of sheep, and 11 tons of Indian corn. Twenty-four days were spent in Cherchen before this large caravan could be collected; during which haggling, arguing, and bullying went on, in a manner only known to those who have to deal with Asiatics.

On 12th April they at last got away. Wood soon became extremely scarce, and they were forced to rely upon the standard fuel of that region, dried camel dung; this is known as *burtza*, and it gives out a pungent blue smoke, and coats everything in the vicinity with soot. Rivers across their path occasioned difficulty, sometimes necessitating long detours before they could be forded, for there were no bridges. At one place a stream ran across the centre of a frozen marsh, with banks of ice 4 or 5 feet high on either side; down the channel cakes of

172 Modern Exploration — Triumphs

ice gaily floated with the torrent, and one of these caught Littledale and his pony, and carried them some way down before they could recover. A way down to the water and up from it had also to be cut by breaking away the ice cliffs with axes. A little later the drivers became alarmed as their distance from Cherchen lengthened, and they asked to go back; but Littledale refused, and by promises induced them to continue.

On 28th April they were high in the mountains, and succeeded in crossing a pass in a snowstorm; however, still higher mountains loomed ahead. They had no guide who knew anything about the district; there was no fuel and no green fodder; and without fuel they could not melt the ice so as to get water. By persistence, however, things improved. Next day the country opened out; water and grass came in sight; and as the men assured them that they were now in Tibet most of them were paid off, being sent back with all the surplus animals. Alas for Turki veracity! They soon found that they were still on the wrong side of the main mountain chain; and going up one valley and down another, looking for a pass, in bitter weather, with frequent snowstorms, was slow, disheartening work. After ten days of it they at last found a way over into Tibet, but the ascent cost them five or six donkeys and two horses, and the death of an animal meant of course the redistribution of the loads. It was a great relief to Littledale to find the snowy peaks behind him; in front stretched a limitless prospect of flat plains, bordered by distant mountains, and usually containing cold, clear blue lakes.

When we talk of the Tibetan plateau an idea rises in the mind of a high plain buried in snow and containing only a few miserable inhabitants. This is altogether wrong. Tibet is not really a plateau at all. It is a series of very high valleys, mostly about three miles above the

sea, all running more or less from west to east, and separated by eight great chains of mountains; owing to the great altitude of the valleys the mountains exceed them only by 2000 or 3000 feet, though occasionally giants soar much higher. The seven main valleys are broken up by cross hills into innumerable small basins, most of which contain lakes and very little else; and the mountains come down to these valleys like cliffs to a shore, often ending there with wonderful abruptness. Except in the south there are no trees, and only in the more favoured districts will grass grow. Most of the rain falls in the south, and here we find the great bulk of the people, congregated in Lhasa, Gyantse, Shigatse, and other towns, with cultivated fields, temples, gilded images, and all the paraphernalia of their all-powerful religion. In the centre of the country are some celebrated salt workings by the shore of a lake, from which the Salt Road goes to Lhasa, for salt is a Government monopoly. The lonely northern valleys also contain extensive shallow gold workings; and from this district the Gold Road goes likewise to Lhasa, gold being another Government monopoly. As conscience is also a Government monopoly, the poor ignorant nomads, with their cattle or yak, and sheep and goats, have very little that they can call their own, except a view of the cold blue sky, the barren plains, and the dull grey or bluish mountains.

Anyone approaching Lhasa from the north-west, as Littledale did, must cross seven of the mountain systems in succession. It is not really difficult, except at one or two points, as there are numerous gaps; but even in the valleys one is constantly at the level of the top of Mt. Blanc, and the rare air makes exertion strangely laborious. One's heart beats as if it would burst its prison, and the prospect of a climb up even an easy pass is a dismal one. The greatest difficulty, however, is to keep the animals of

174 Modern Exploration — Triumphs

the caravan alive; for throughout the first part of the journey all their food must be carried on their backs. No sooner does one get into the slightly more genial southern valleys than Tibetan shepherds become common, while the plains are dotted by their herds of yak or sheep; and these people are bound, under penalty of a horrible death, to report to the lamas any foreigners found roving the land. Consequently, if one attempts to feed one's animals at these points, one's presence is soon detected; and as the news passes by word of mouth with extraordinary rapidity, opposition can be placed in the travellers' way before they are even aware that their movements have been seen.

Knowing all this, Littledale took good care to keep out of the way; and for a long time his southward progress was made by hopping into ravines and behind cliffs, so as to avoid any natives whatsoever.

For some time this plan succeeded. Besides the three Europeans there were now only ten carriers; and the worst risk they ran was entailed by the morning round-up of beasts that had strayed away. In the north, where no Tibetans were seen, numerous antelope dwelt; they were so tame that one ran along beside the caravan. Unfortunately, wolves also abounded, and one night they raided the caravan, killing the entire flock of sheep.

The party now passed across a succession of short, steep passes, while the weather continued bitterly cold, drifted snow cutting like crystals of glass. The poor animals, deprived of fresh food and weakened by long exposure, lay down, and neither shouts nor blows could raise them; some had to be shot, to put them out of their misery; and every day, as the transport weakened, the loads increased, until at last it became necessary to abandon all creature comforts, taking forward only what was essential to get to Lhasa. Just as things were looking

bad they came to some good grazing; here they stayed a week, fattening up their animals.

On 26th June they saw the first men since leaving Cherchen; they were Tibetan salt collectors, and in order to avoid them Littledale made a night march, but got stuck in an unsuspected swamp. With much muttered bad language from the carriers, and much heaving and hauling, they got out again; and after marching all night camped in a secluded valley on the Lhasa side of the Tibetans.

From this time onwards Littledale and his nephew always went in advance, armed with telescopes; and whenever they detected the skeepskin coats of the nomads they changed their course. Frequently it became necessary to camp during the day in a ravine, and to make a march the next night past sleeping natives; herein they ran a risk from the savage Tibetan dogs, but always they escaped detection. It was a near thing, however, more than once; as when a cock and hen fell off a donkey's back and began to clack. While the owner's fingers itched to strangle them a mule trod on a Turki dog, and started it howling! On another occasion they ran into some shapeless forms in the gloom, and procuring lights found that they were only yak!

In this way they crossed like robbers from valley to valley, steadily approaching Lhasa.

The method had its disadvantages. They could not use the main road, of course, and once they came to a river that was too deep to be forded, while a populous plain lay beyond. At this juncture they made a boat out of the camp bedsteads and the tent ground sheet, and with the aid of a rope ferry safely carried everything across in this strange craft. Resource is the explorer's right hand: Mr. G. M. Dyott, when in the Amazon wilds, once damaged his camera so that light got in, but

176 Modern Exploration — Triumphs

he repaired it with the latex from a green banana. A dozen other cases of this adaptability among explorers leap to the mind.

The Littledales had now almost reached the end of their tether. They came to a valley which had to be passed, and in which there were thirty tents; so with a bold air they went straight on and passed through unquestioned, probably being taken for merchants. The next day, however, some shepherds detected them, and the hunt was up.

Lhasa was about eight forced marches away. Littledale determined to try to reach it before the local officials could collect their wits or their forces. Accordingly, he now stuck to the road without any pretence at hiding, maintaining a series of running interviews with village headmen and others who threatened or implored them to stop. Crowds of so-called soldiers, armed with swords and ancient matchlocks, and mounted on the stocky Tibetan ponies, escorted the little caravan; and whenever it halted there was much confusion and gesticulation. Littledale, who had no guides, was compelled to rely to some extent upon these people for the road, and he soon found that whenever they opposed a projected line of advance the correct road was indicated; on the other hand, when they permitted the caravan to advance without hindrance, the course was a wrong one. Once, by doubling on their steps and retreating down a valley, the little party threw the Tibetans off the scent, but generally some of the grimy, stupidly smiling little men were to be found hanging to the travellers like leeches.

Under this strain most carriers would have deserted, and as it was, prayers to Allah were both frequent and vehement. Littledale, however, had some fighting Pathans in his caravan, and these men formed a stiff nucleus which could be depended upon in case a fight

ensued; while he and his nephew were not the sort of men to be stopped by anything short of actual violence.

In this way they came at last to the blue waters of Tengri Nor, the largest lake in Tibet. Here Bonvalot and Hedin had been turned back. Beyond a river lay a maze of dark ravines, leading up into the heart of a gigantic mountain chain, with snowclad peaks; and beyond that was Lhasa. Unfortunately they did not know of any way across this range, nor, naturally enough, would the Tibetans help them; but after some wandering they found a valley in which all the grass had been cropped by animals. Arguing from this circumstance that it must be a much-used route, they began to ascend it; it closed in, becoming a narrow gorge, while masses of fallen rocks littered the ground. Suddenly they were hailed to stop, and there, hiding behind every rock, were the Tibetans, armed with ancient but quite serviceable matchlocks, and determined to dispute the road. Littledale went forward, waved his Chinese passport about, and explained, with appropriate gestures, exactly what would happen if the Dalai Lama learned that he had been detained, but such threats had no more success than those of previous travellers had had. "Back you go!" was the cry. He then ordered his men to load their rifles; and at this indication of serious trouble the Tibetans became alarmed and hung back. Littledale at once ordered his caravan to advance, and the murmuring mob was soon left behind.

Shortly afterwards they climbed over one of the highest passes in the world, the Goring, 19,587 feet above the sea. The top was simply slippery ice, flanked by bare mountain walls on either side; part of this glacier was broken by crevices, and treacherously steep on the Lhasa side. It was snowing hard, the thin needles blow-

178 Modern Exploration — Triumphs

ing into their faces and reducing the visibility to a hundred yards or so.

Had they pushed on at this critical juncture they must assuredly have got into Lhasa; but unhappily the transport had lagged behind, the donkeys experiencing great difficulty in getting over the high pass. When at last they did arrive at the camp that had been made below the glacier, they were exhausted. Another day was lost in resting them, and in this interval the Tibetan resistance at last became effective.

Lhasa had become alarmed. Littledale, standing at the door of his tent, heard the clatter of hoofs; a cloud of dust ascended the valley, and from it there emerged "a comical, jovial, roundabout" person, evidently a high official, accompanied by about a hundred armed men. He wore a broad-brimmed hat carefully covered with green oiled silk; and he explained, squatting on the ground in characteristic fashion, that if he permitted the party to continue he would certainly have his head cut off; nor was this mere bluff, as some people who contributed to the subsequent advance of the British Mission were most cruelly done to death in consequence. The Englishmen, at that moment, had nothing to fear; they had plenty of provisions, and time was of no consequence, whereas a row might have brought on fatal results. Rightly or wrongly, the traveller stopped. The next day three new officials arrived, with more soldiers. A letter was written to the Dalai Lama requesting permission to proceed; the only result being a week's delay, while more and more soldiers arrived.

Meantime, Littledale hoped to beat the Tibetans at their own game of dallying, and amused himself by catching butterflies and plant collecting. Lhasa now regarded him so seriously that the Governor of the city and the head of the army arrived, with specious argu-

ments, and impressive in their richly jewelled clothes. They said he must go back. He retorted, "Impossible!" He insisted on going forward; and they replied, "Impossible!" Meanwhile, the season was drawing on, and if the fates were propitious, an early autumn snowfall might close the pass, and compel the Englishmen to remain in the Lhasa valleys. The city was distant but little more than a day's ride. The Governor, an elderly and extremely wily old rascal, did not dare to lay violent hands on his unwelcome visitor; in fact, he did not know what to do with him. At this moment a totally unexpected event changed the aspect of affairs completely.

Mrs. Littledale, who had long been ailing, became seriously ill. The great altitude, the daily exertion in the rarefied air, and the hardships inseparable from such a journey, had told upon her, so that medical treatment became an urgent necessity. Littledale at once threw up his plans, despite her protests. He offered a bribe of about £400 to the temples if he were allowed to pass through Lhasa, and down to India by the shortest route, but his communication was never allowed to leave the camp. Realizing their advantage, the other side insisted that he should go back by the way he had come.

Of course he refused, but at last, in desperation, he consented to return to Ladak, a mere 1200 miles, but by a different route along the central valleys. He insisted on a letter from the Governor saying that all men must help him; it was solemnly written out, and on being translated, was found to read, that all men must turn him back, and not allow him to put a foot on Tibetan territory. He tore it up, and demanded a proper one; but on the very same day as the old Lama wrote it, he sent out another, telling headmen to turn Littledale back, wherever he might be!

Sadly the little party began its retreat on 29th August.

180 Modern Exploration — Triumphs

Mrs. Littledale was now incapable of walking, and wood had to be procured from Lhasa with which to make her a litter. At the dreaded Goring Pass, to which they were escorted by Tibetan soldiers, she took to a yak, on which she rode over the glacier. No sooner were they all safely over than the Tibetans left them, secure in the belief that they could never get back again. Only five men were available for the sixty baggage animals, which strayed all over the place; urgency was needed, both because of Mrs. Littledale and of the onset of the bitter Tibetan winter; and the leader had an anxious time, shepherding his men from valley to valley, besides mapping the route as he went.

Eventually, however, they got out of Tibet without much difficulty, except for one incident, when the Governor's treachery was detected. A headman in Rudok, who had received instructions to turn them back, insisted on their going all the way back to the Goring Pass. When they produced their rifles he sullenly gave way.

So ended a long and very important journey, which, although it just failed in its main object, added materially to our knowledge of Tibet.

Apart from the adventures of Littledale and Hedin, the principal interest of Tibet became political. A Mongolian of Russian training, named Dorjief (he had other names, but this was his most familiar one), went to Lhasa, where he long resided among the monks, acquiring a considerable influence over the Dalai Lama. Russia naturally seized this opportunity of extending her influence; and a treaty between that power and Tibet would probably have been signed, but for the opposition of the Chinese Viceroy and the still more important hostility of the three great monasteries. An anti-British reaction occurred, however, which gave Lord Curzon, then Viceroy of India, an opportunity of intervening. After much

argument with the home Government, a Mission was decided upon, under the leadership of Sir Frank (then Colonel) Younghusband. With him were two other remarkable men: Captain O'Connor, who had an immense knowledge of Tibet and things Tibetan, and Mr. Claude White, almost the only Englishman who at that time was *persona grata* at the secluded little court of Bhutan.

The object of the Mission was to demand an explanation of a Tibetan invasion of part of Sikkim, to re-establish trading arrangements, and to insist upon the residence of a British representative at some prominent place in Tibet.

This Mission, which was not at first accompanied by the military, went to Kampa Dzong, a town in southern Tibet at the back of Mt. Everest; and there it stayed from 7th July, 1903, to 6th December, without in any way furthering its objects. The Tibetans first, last and always sent men from Lhasa who, whatever their authority, were not empowered to do anything. Their only argument was the parrot cry "Back to the frontier!" and they were quite incapable of understanding that the British meant business. The Dalai Lama, who was entirely under Russian influence, thought by this constant dallying to wear out the patience of the invaders, in precisely the same way as he and his predecessors had forced ordinary travellers to withdraw; and in this he had an unwitting ally in the British Government, which was loth to undertake what appeared to be an invasion of Tibet. Younghusband, however, was not the man to be trifled with. He knew from the start that the Mission must end up in Lhasa if it were to do any good; and to Lhasa its steps were directed by the inexorable trend of circumstances.

It being evident to all by the autumn of 1903 that the Tibetans would neither treat nor fight, military prepara-

182 Modern Exploration — Triumphs

tions began. The road to Kampa Dzong and that to Lhasa, though side by side, were separated by high mountains. It was therefore necessary for the Mission to retreat, in order that it might advance again along the easier road which had been chosen by the troops. These movements took place simultaneously.

Advancing through Sikkim with about 2000 men, General Macdonald established himself in the high and hitherto unoccupied Chumbi Valley. He had under him six companies of those hardy hill fighters, the little Gurkhas, and eight companies of Sikhs, all, of course, with British officers. Besides this, there were sappers, a machine gun, and some mountain guns, together with all their transport. It was necessary for a great part of the way to make a road for mules, the guns being carried on the backs of those sturdy beasts. The track sometimes tunnelled amongst huge rhododendron trees, interlaced with a hundred creeping and climbing plants, sometimes emerged on the edge of a precipice many hundred feet deep. At some places it was so bad that mule transport was at first impossible, and here all the supplies had to be manhandled. Nevertheless the remarkable feat of getting up all that was needed for the little army went through without a hitch, thanks chiefly to the organizing powers of Major Bretherton.

All being ready, the troops started north on 11th December, 1903, in the depth of winter, to cross the Jelep Pass, a high gap between the mountains, on one side of which lay the forested valleys of Sikkim, while on the other were the barren and bitterly cold high valleys of Tibet. On entering the Chumbi Valley they were soon brought up by a wall at Yatung, which the Tibetans occupied, and were preparing to defend. The orders of the Mission were to avoid fighting whenever possible, but at this anxious moment it looked as if war

must break out. As the leaders rode forward, however, the Tibetans came out to meet them; they protested, but did not oppose the advance; the gates opened, and this valuable post was gained without a blow.

The Tibetans were under the impression that their long, bitter winter, with its severe snowstorms and its furious gales, would render impossible any protracted stay on the part of troops fresh from the hot plains of India. In order to impress them, therefore, an advance guard of about 450 men, together with the Commissioners, went on down the Chumbi Valley, crossing the very high and cold Tang Pass; the town of Phari was entered without opposition, and eventually they established themselves at a place called Tuna. Here, at an altitude of 15,000 feet, they stayed through the winter. In all these operations, remember, the troops were rarely at a much lower altitude than the top of Mt. Blanc. Besides the weariness naturally induced by the rarefied air, they had the additional disadvantage of having to carry rifles and accoutrements.

For three weary months the negotiations dragged on without result. Officials of sorts made their way to Tuna, while the Chinese Viceroy, whose authority had been flouted at Lhasa, was openly in favour of treating with the British; but the men who mattered—the grubby, oily little monks, in their crimson or saffron robes, with yellow caps and jewelled ornaments—held aloof. Nine miles north of Tuna, at Guru, a small Tibetan army lay encamped, and thither Younghusband went one day, accompanied by O'Connor. They were received very badly by three Lamas, the representatives of the three great Lhasa monasteries, and for a moment it looked as if they would be surrounded and massacred. By a great display of indifference, however, they overawed the enemy, and withdrew. It was quite clear now to every-

184 Modern Exploration — Triumphs

body but the Government in London that if British prestige were to be maintained an advance on Lhasa was essential; nevertheless, that advance only came about later, as a result of further humiliations.

During this time the difficult task of pushing up stores to the Chumbi Valley, and constructing a road over the worst places, went on without a break. Meanwhile, the people of that part of Tibet, impressed by the English policy of always paying well for whatever they took, and of not interfering unnecessarily with the customs of the country, everywhere received them with pleasure. Even the abbots and monks of monasteries along the route were willing to admit them, although they hid their most precious ornaments in the nunneries, "because the English were known not to attack women". Only from the bigoted fanatics of Lhasa did opposition proceed; and until these monks were taught a lesson no further progress was possible.

Accordingly, on 29th March, 1904, Macdonald set his troops in motion, marching across the Tang Pass in the teeth of a blinding snowstorm, towards Gyantse, one of the chief Tibetan towns. Preceded by mounted infantry (whom the Tibetan troops soon came heartily to dread) the long column wound its way down the barren valleys, past the advanced post at Tuna, and pulled up before Guru, where the Tibetans made a stand. The enemy had built a wall, but only partially across the valley, and it was the easiest thing in the world to out-flank it and take them in the rear. They were so surprised at this operation that they allowed themselves to be herded together, and were being disarmed, when their general, in a sudden fit of courage, or madness, or both, fired at a Sikh, and wounded him. This first shot not only started pandemonium, but it opened the Tibet Campaign. The Tibetans, many of whom still possessed



1563

THE POTLACHA, LHASA

By permission of Lt-Col F. M. Bailey (who took the photograph) and The Royal Geographical Society, London

both swords and guns, suddenly turned on their Gurkha and Sikh captors, and in the mêlée might have done much damage had they not been caught by an enfilading fire from both slopes of the valley. The fight was soon over. The enemy turned and fled, leaving many dead and wounded behind.

The expedition then moved slowly on to Gyangtse, with no more serious interruption than the discharge of a few ancient muzzle-loading cannon, weapons that were out of date even at the Battle of Waterloo. These *jingals* are fired at high angles, shooting a ball of lead about the size of a cricket-ball, and rarely hitting anything except the ground; indeed, when they go off, there is much more risk to the gunners from the explosion of the charge than to those for whom the missile is intended.

Gyangtse lies in a wide flat plain, between the inevitable steep hills. It is dominated by a large fort, placed on a hill rising out of the plain, and looking for all the world like the castles drawn by imaginative artists in fairy books. Wide steps lead up one side, being overlooked by strong defences; on the other sides the precipitous rock is crowned by the castle walls. In the hands of real soldiers the place would have been a serious obstacle; but the Tibetans, discouraged by their losses at Guru, abandoned it. The British found there an immense quantity of stores, which they appropriated; but for some inexplicable reason the desire not to hurt the Tibetans' feelings overcame military prudence, and the fort was not occupied. Instead, an armed camp was established less than a mile away, at Changlo, within easy range of the guns of the fort. All the Tibetan quarters being too verminous to sleep in, the officers throughout the campaign occupied tents.

This was in April. Negotiations were now renewed; but in the middle of them the Tibetans determined on a

186 Modern Exploration — Triumphs

treacherous attack upon Changlo, with the idea of destroying the Mission entirely. The opportunity was favourable. Part of the British force had been sent on to occupy an important cross-road, the Karo Pass, and the great bulk of the troops were some way distant, with Macdonald. Only Younghusband and a handful of men remained in the armed camp.

The Tibetans had 1600 men. On the night of 4th May, half of them advanced silently upon the fort, which they occupied without resistance. The other half crept up to the wall of the camp, and were almost over it before a sentry saw them and fired. Then pandemonium broke loose. Bullets ripped a way through the mud walls of the camp, the position of which was defined throughout the hours of darkness by a ring of fire. With remarkably slight losses the attack was beaten off, the enemy leaving 180 dead outside the walls, and carrying off their wounded.

There now ensued for Younghusband two anxious months of siege, or rather of investment, for he maintained daily communication with Macdonald, while the enemy even neglected to cut the telegraph wire. There were about two dozen of the ancient muzzle-loaders in the fort, with which a daily bombardment of the camp was maintained, though I believe not a single man was ever killed by it. This serio-comic warfare lasted until the General came up in June, and relieved the Commissioner. The investment of Changlo had one advantage. It at last convinced the Home Government of the need for an advance to Lhasa.

In the meantime, Colonel Brander, with the bulk of the camp defenders, who had been absent when the night attack took place, had carried out one of the most extraordinary battles on record. The Karo Pass is some 16,000 feet above the sea. Commanding the roads to Lhasa, Gyangtse, and a third important town, it was

vital that it should be kept clear. The Tibetans had built a stout granite wall across it, constructing openings whence rifle fire could be directed upon any assailants; this wall stretched right up to the mountain sides, and was protected by strong earthworks.

Diverting the enemy's attention by the semblance of a frontal attack, Brander made his Gurkhas climb an extremely steep cliff and cross a glacier, somewhere about 18,000 feet above the sea; thus they were enabled to take the Tibetan defences in the rear, when of course, after a short fight, the whole position collapsed and the enemy fled.

With the arrival of summer, the Mission, accompanied by its steel-headed arguments, moved on from Gyangtse to the bank of the Brahmaputra, Macdonald systematically clearing out the Tibetans from every stronghold *en route*. There was very little further fighting, and none at all after they crossed the river; but a constant succession of deputations from Lhasa arrived, dressed in all the colours of the rainbow, and begging Younghusband not to proceed, but of course without avail.

It took a week to cross the Brahmaputra; but the enemy had had the incredible stupidity to leave ferry boats there, and by their aid a communication was established across the broad, swirling stream. Some military boats that had been brought up by the expedition proved too light for the treacherous whirlpools; one of them upset, an accident in which Major Bretherton, the principal transport officer, was unfortunately drowned.

The way to Lhasa lay round the foot of a glacier that fell from the flanks of a mighty peak, and then up a long winding pass; this was an ideal post for defence, and great preparations had been made to hold it, nevertheless it was abandoned to the English. They then came to a broad, flat valley, surrounded by steep hills. In the far

188 Modern Exploration — Triumphs

distance, clearly visible above the scattered trees, stood a huge rock, on which a white mass soared boldly heavenwards, terminating in a roof of beaten gold. It was the Potala, the Great Palace, and the gateway of Lhasa. The holy city was in sight at last!

Those who rode on first encountered sullen, dirty, and nauseous monks, mostly clad in filthy red gowns. Lhasa itself proved to be an insignificant little town of flat-roofed one-storied houses, separated by unpaved streets in which pools of dirty water and piles of garbage had accumulated. In the midst of all this rose a splendid cathedral, with a golden roof. By far the most striking object was the Palace or Potala, which rose nearly 500 feet above the plain, and looked like a huge white prison, with its square windows and its long straight stairway of approach.

Now began the worst task of the Mission. The Dalai Lama and his Russian adviser had fled. A Regent and three others formed the Council; but nothing could be decided without the monks, for nobody had any authority. The result was that for weeks interminable conversations went on. The same things had to be said over and over again; the same sentiments expressed; the same sort of wash, miscalled tea, drunk (it is a mixture of block tea, rancid butter, salt, and warm water, and is indispensable in Tibetan life); and the same wearisome efforts made to convince the Tibetans of the justice of the British claims.

Eventually, by combined firmness and patience, Younghusband won this campaign as completely as the troops had won theirs. The first British Resident, O'Connor, took up his post at Shigatse. The frontier was readjusted. Russian hopes receded, apparently for ever.

Although the prohibition to visit Lhasa was again

instituted, Lhasa has been visited since by Europeans on a number of occasions. The old prejudices, however, fostered by the continuance of the monkish rule, are impossible to eradicate; but in other respects than admittance to the sacred city the Tibetans are now much more amenable to reason. They were also severely dealt with by the Chinese, whose authority had been nominal too long. The result of all this was that when Young-husband made representations before the Everest expeditions of 1921-4, permission was freely granted to enter the country; and the abbot of the monastery nearest to the mountain even blessed the enterprise.

While in Lhasa, the British officers saw a good deal of its temples. Ornamented outside by whitewash and bold stripes of colour, their walls within are covered with designs of demons, dragons and representations of Buddha. Every temple has its great idol, its rich ornaments, and its peculiar rows of candlesticks made of butter and wax, and burning butter; despite which the interior is always filthy, and usually gloomy.

Round the city runs a path, trodden level by the feet of countless pilgrims. This is the famous Lingkor, or Sacred Way; everybody who makes its circuit from left to right is thereby absolved from sin, or at least forgiven a good deal of it. In a city which holds more than 20,000 monks of intriguing mind and unclean manners, such a road seems highly necessary.

CHAPTER II

The Conquest of Roraima

My father, who resided for some years in British Guiana, once met a surveyor there who had just had a singular adventure.

A party, of which he was a member, had been exploring the great forest that covers most of the low coastal plain of that colony; and the surveyor, who was armed with nothing more formidable than the tripod of a theodolite, had got ahead of his companions. He was passing through a glade, flanked by massive trees and dense undergrowth, when suddenly, upon rounding a corner, he came face to face with a gigantic jaguar. The animal stood still within a few feet of the path, looking at him. He had no means of attacking it, and he knew that to turn and run away would be fatal, for wild beasts nearly always pursue that which flees from them. Summoning up all his resolution, he walked on, straight past the jaguar, which never moved. When he had his back to it he experienced a horrible "creepy" sensation, expecting the great beast to spring upon him from behind at any moment. Fortunately it ignored him, and he escaped.

British Guiana has other adventures to offer, besides encounters with wild beasts of the forest. The numerous Indian tribes who dwell between the brawling mahogany-coloured rivers are only partially civilized, and have many curious customs; some of these people are so primitive that they even manufacture stone tools. Hunters

and fishermen all, they catch fish by shooting arrows at them through the water; they also have great skill with the blowpipe, a hollow cane ten or twelve feet long, through which they project poisoned darts at their prey. Unlike the wild men of the vast Amazon forests in the south, these Indians are mostly docile and good-tempered; and it was largely due to their good offices that the following exploit was made possible.

You may never have heard of the Potaro River. It is one of the headwaters of the Essequibo, a brown, swirling stream, sometimes opening out into wide expanses, at others confined between walls of green, and roaring and tumbling over cataracts and falls. Its banks are lined by masses of beautiful water lilies and other aquatic plants, behind which the densest of forests stretches in impenetrable gloom.

This river forms one of the two chief lines of approach to the famous mountain, Roraima. During recent years it has become almost a tourist route, but matters were very different in the early 'eighties, when the Potaro was uninhabited, except for one or two scattered mission stations and the conical huts of a few half-tamed Indians. At that time the district was controlled by a young magistrate, Everard im Thurn, who possessed a strong natural bent for exploration, together with a passion for botany. To im Thurn the name of Roraima was as the flash of a richly jewelled ring to a diamond merchant. Its inaccessible precipices, its remoteness and difficulty of approach, the legends of mysterious beings dwelling upon it, and the certainty that it would yield him rare plants, fired his imagination and he determined to ascend it.

Roraima had been visited only on six occasions and had never been ascended; in fact, only a year before, a bird collector had looked up at the vertical precipices

192 Modern Exploration — Triumphs

from their base, and had written that one might ascend the mountain in a balloon, but not otherwise!

Unlike most mountains, this mysterious summit was known to rise like a castle, and to have a flat top; and as it was by far the highest point either in or near the colony, scientific men were curious to know what conditions prevailed up there, what could be seen from the top, and what plants grew on it. So it happened that, supported by the great botanist, Sir Joseph Hooker, im Thurn was financed by English scientific bodies, and in October, 1884, he started out.

Apart from the leader, the expedition comprised Mr. H. I. Perkins, a Government surveyor, and eighteen Indians, the whole being carried in three large, heavy dug-out canoes, hollowed out of the trunks of trees.

Once away from civilization food becomes exceedingly scarce in the Guiana forests; for the Indians cultivate nothing but the cassava plant, from which they make tapioca, besides yams or sweet potatoes; they are always improvident, having no granaries; and even when there is a surplus of food they are loth to part with it at any price. These circumstances made it necessary to take food supplies for the whole party for three months, which for twenty men meant a heavy load.

The Essequibo runs in from the coast as a wide estuary, with one shore almost out of sight of the other, but it is by no means easy for boats to ascend, because of the numerous bad cataracts. In the wet season all the rivers rise so high that the cataracts are submerged, and the country far and wide is flooded to a depth of many feet; this offers fresh difficulties, because the streams then run so fiercely, with such whirls, and eddies, and curving-crested waves that one cannot make way against them except in a strong power launch; the absence of camping grounds, also, frequently necessitates sleeping in the

boats, and to anyone who has been cramped up all day in a dug-out canoe this is no joke. An accident when the river is low may result in nothing worse than a ducking, but when its uncontrolled flood rolls seaward at its height, anyone unfortunate enough to go overboard would almost certainly be drowned.

These reasons determined im Thurn to start in October, when the rivers were low. For nearly fifty miles the expedition struggled up the Potaro. At shallow places they had to get out and haul the boats over the rocks; at narrows, where the water ran fast, they pulled themselves along by the branches of trees—an unenviable task, for such trees are almost always smothered in vicious, biting ants. Where a cataract occurred, or rocks ran across from shore to shore, the canoes were landed, suitable branches were broken and shaped into rollers, and on them the heavy craft were tugged overland past the obstruction. Finally, they stopped three miles below the great Kaieteur Waterfall, one of the largest in the world. Here the Potaro gathers itself into a mass about 120 yards wide, and makes a single leap of 722 feet—twice the height of St. Paul's Cathedral—into a great pool; after which it tumbles for another 80 feet down a roaring cataract like an immense weir. *Kaieteur*, by the way, means “Old Man”. It is called Old Man Fall because the Indians have a legend that an old man among them who had grown past the stage of usefulness, and was become a burden upon his tribe, was put into a basket and sent to his doom over the fall, a characteristically simple way among savage people of dispensing with Old Age Pensions!

At this point the canoes were beached. The Indians, armed with knives, cut a way through the undergrowth, rollers were fashioned, and they started to pull the boats overland. Unfortunately, the dug-outs proved too

194 Modern Exploration — Triumphs

heavy for this procedure. One had its bottom ripped out by a projecting tree, and the others also had to be abandoned. The goods were then all manhandled up a slippery and dangerous path to the top of the fall; the Indians carrying their loads on oval frames, tied by a wide band round the forehead. Throughout this operation could be heard the unceasing roar of the fall, a vast body of water, even though at that time the river was low. Im Thurn, standing on the brink, could discern at his feet nothing but a rolling mist, through which beautiful rainbows played. The backwash from the tumbling water had eaten so far back into the wall of the cliff as to make behind the fall a huge, mysterious black cave; and here, dancing in and out of the sunlight, thousands upon thousands of swallows found a home.

Once on the river above this obstruction, our travellers found two very unhandy canoes, in which they transported themselves and their stores, with the same difficulties as before, for a good stretch towards the mountain, before it became necessary to take to the forest.

Seen from the constant turmoil and movement of the river, with the pitiless glare of a tropical sun overhead, and not an atom of shade anywhere, the entrances to creeks, overlaced by vegetation, quiet, green, and still, were indeed tempting: how much more so then would be the forest, where the giant trunks soared two hundred feet above the ground, and all their tops formed one huge canopy of leaves and branches!

The reality, alas! was very different. The route now became a mere Indian path, distinguishable only by the saplings which had been bent down so as to blaze a trail. A forest of trunks, immovably still, rose above the travellers, and the undergrowth, except where rare patches of light flickered through, was thorny, the leaves having no green, and hanging dead and withered. Great

trailing ropes of orchid roots or other climbing plants hung down like nets, ready to catch the unwary, and the laden Indians were constantly becoming entangled, every such event necessitating a halt of the whole column. The two white men, lacking the surefootedness of their companions, were compelled to grope their way along, oppressed by the silence and gloom of the place, yet with eyes and ears constantly alert. Unceasing vigilance was demanded for the observation of wild animals or birds, for the avoidance of the unending tangle of roots and treacherous holes. There was, furthermore, the constant risk of treading on a poisonous snake. Spiny branches swung in their faces; masses of slippery wet leaves putrefied the air; and the dull green moss offered a foothold little better than ice. Worst of all was the apparent lack of life, the terrible stillness of the forest.

At convenient openings, where some runnel pursued its tortuous course, its waters stained brown with organic matter and its banks marked by a heavier undergrowth, the party stopped. Here, as a rule, a little light could be had, though the freshness of day always dwelt far above, and only shafts of sunlight pierced the vegetation, as they would descend through the stained glass windows of a cathedral. Loads were dumped and fires lighted, and at nightfall hammocks were slung to the trees, and a travesty of rest was enjoyed by the party, tormented by mosquitoes, and keenly alive to all the dangers, real and supposed, of the place.

Imagine their relief when, after four days of this gloomy forest, they suddenly emerged upon the open grassy country or savannah, with its rolling flower-covered hills, in bright sunshine, and everything pulsating with joy and life! Now they came upon Indian villages, clusters of beehive-shaped huts, with small patches of cultivation, pigs, dogs, and monkeys. At each there

196 Modern Exploration — Triumphs

would be a halt, while the copper-skinned, oriental-eyed and long-haired Indians clustered round the white men and held a palaver. At some of these places im Thurn left a portion of his provisions, to be used on the return journey. The Indians are nominally Christians; and they took the opportunity of every halt at a village to pay their devotions—some of them even “went to church” whenever the fit took them, not a very useful habit in an expedition on the move!

At one place, Konkarmo, the party saw Indians carving axes and ornaments out of the serpentine rock. They first selected a stone that somewhat resembled the object which it was desired to make; and then, chipping it with a knife or a harder stone, they gradually brought it to the requisite outline, afterwards rubbing its surfaces smooth.

The carriers who had brought them thus far now gave way to a party of Arekunas, under a rascally headman nicknamed Arekuna John. These proved good strong fellows, but they were insatiably greedy, coveting everything that the white man possessed. Nevertheless, they served their purpose, by transporting im Thurn, Perkins, and the supplies to Teruta, a permanent village at the foot of the mountain. A day or two earlier a German orchid collector named Siedl had arrived there by way of another river.

They now began to realize the difficulty of the task before them. At the foot of the village ran a stream, at present low, but usually wild and turbulent. Its upper course was in a deep gorge, absolutely choked with trees and shrubs, and this led (to the left, as one faced the mountain) between Roraima and a slightly lower summit, Mt. Kukenam.

The two mountains which were thus separated by the gorge had the aspect of great castles, with none of

the splintered peaks so often seen in high summits. Their red sandstone sides sank vertically, just like walls, into the upper part of a dense forest that struggled to maintain a hold on the steep talus slope at the foot of each. Towards the gorge the cliffs overhung, and almost met; yet the narrow slit between them was 2000 feet deep. Streams of water tumbling from the upper parts of both mountains jumped clear down to the forest edge, so sheer was the drop; while the distance was sufficiently great for them to separate into particles, falling as rain. A few misshapen shrubs hung precariously here and there, diversifying the bare red rock; but there was only one way up which anything but an insect could climb. Towards the gorge, where the forest lay densest, a ledge, somewhat resembling the approach up the side of a child's castle, sloped steeply up towards the summit; but its lower part looked very difficult, while above it had been broken away in two or three places, and two-thirds of the way up was a cleft made by a stream of falling water. No other route offered the slightest hope of success.

The first thing to do was to establish themselves as high as possible. Accordingly, they crossed the stream and ascended the hill beneath the forest to a grassy and swampy flat, where they soon established a miniature village of their own. At this place they stayed a month. They built circular huts with clay walls and a pole in the middle; the conical roof of each hut was made from palm leaves, than which there is nothing better in that climate to keep out the rain. As they worked, the gigantic cliffs rose menacingly from beyond the forest above them, their upper parts constantly hidden by driving mist; while to men accustomed to the moist heat of the coast every day seemed cold and raw. Each hut had two openings facing one another, but no hole in the roof;

198 Modern Exploration — Triumphs

and as fires were always burning inside near the hammocks, the smoke speedily made the interior black with soot. This, however, was a blessing in disguise, because it kept off most of the insect pests that love such places.

For some days all was animation in the little camp. While one party of Indians set off to cut a path through the forest to the foot of the ledge, im Thurn and the remainder were out in the vicinity of the camp, usually botanizing; the leader, besides, had the thousand and one odd jobs that fall to a man when employing savage labour. He also had to supervise his growing collection of plants. Each specimen had to be dried before the fire, otherwise it would have been rapidly covered with mildew in that damp air and spoiled. Every day, as he looked at the mountain, clouds rolled ominously along its top; and the mists, gathering in the gorge between it and Kukenam opposite, seemed to bulge out towards him, as if the evil genii of the place were barring him from the higher regions. Far below, smoke curled up contentedly from the Indian village; all around was a riot of strange and beautiful plants, and in the distance, behind range after range of wooded hills, lay the open savannahs and the plain.

The swamp beside the camp was a wonderful place. Out of the long grass rose masses of rock that had fallen in days before the forest grew, and now were thickly plastered by lichen and moss. The stonier patches bore clumps of heather; the grass hid many curious and beautiful flowers; tree ferns raised their graceful heads twenty to thirty feet above the ground; brilliant climbing orchids, black and yellow, white, pink, and brown, grew in profusion; and in other places were brakes of bamboo—not the ordinary tall, straight stems, but dreadful climbers, winding around and entangling everything in their grasp. There were also many of the strange

pitcher plants, with their deep green cups, splotted with red, hanging suspended at the ends of the leaves, and ready to entrap any unwary insect that found its way in. Exquisitely coloured little humming birds darted from bush to bush, while in the more watery places wild duck found a home. Flitting everywhere in graceful, sweeping flight were brilliantly-arrayed butterflies, shimmering like jewels whenever their wings caught the sun.

This was life struggling to survive, with an open space in which to carry on the war. The plants might crowd each other, and some might attain a stranglehold that would only end with the victim's death; but at least all had sunlight and air. Far different was it at the upper edge of the swamp, where palms stood in serried ranks, shoulder to shoulder, not one budging an inch; underneath them a dreadful undergrowth, and hanging from their graceful crowns clusters of orchids, themselves the homes of ants and other creeping things. Still worse was it in the dark recesses of the forest, where a continual struggle for life and death went on, between the crowded palms against one another, and against the strangling climbers. Nothing but the sharpest of knives could avail the path-cutters against such a riot of vegetation.

The trail through the forest was as steep as an average hill road. Beyond it the slope increased till it equalled that of a roof. It was also incredibly rough, owing to gigantic blocks that had fallen from above, and under and around which the explorers had to scramble as best they could. All the boulders, as well as every inch of ground, lay hidden beneath a dull green mantle of sopping wet moss, which even overspread the surface of pools of water with its treacherous coat, and into which one constantly stepped without warning, with much wrenching of muscles, splashing and general discomfort.

Beyond this not very cheerful place stretched a belt

200 Modern Exploration — Triumphs

of blackberry bushes and bracken, the latter with its peculiar odour, and both of them strongly reminiscent of home. Immediately behind them, straight as a wall, rose the vertical side of the mountain.

On 14th December, the path to the ledge being ready, im Thurn started to ascend, accompanied by a few of the flat-nosed, long-haired Red Indians. For the work of men unused to instruments, the path was wonderfully straight, but it proved by no means easy for the white man to follow; because the Indian walks in the forest with his feet straight in front of one another, so as to form a single narrow line, and naturally he cuts away no more undergrowth than is necessary. Hence, the unfortunate Englishman was constantly slipping on the glassy leaves, or tripping over roots, or being caught up by treacherous trailing climbers. When one adds to this the constant whipping back of prickly shrubs, the spiny armour of the massed palm leaves, the inevitable stings from swarms of insects, the steep gradient, and the sepulchral gloom and fetid smell, one obtains a picture that is somewhat discouraging.

As they advanced the way grew steeper, and chunks of earth and moss that had perforce to be seized as hand-holds not only squirted water up one's arms, but came away in the fingers, and left one awkwardly poised on the toes, trembling on the verge of a fall among the palm needles.

For two hours they slowly penetrated into this wilderness, the light fading rapidly, and wisps of mist curling around the half-hidden trunks. When at length they emerged from the forest, into a chaos of fallen rocks, the mist rolled down upon them shutting out everything. They felt the cold severely; it was impossible to make the ascent without a fuller reconnaissance at close quarters; and im Thurn gave the order to return.



RORAIMA

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The Conquest of Roraima 201

There ensued three inactive days, during which rain and fog enshrouded the little camp, and our explorer and his surveyor kept within their hut, drying plants and whiling away the time. Throughout this period the gorge remained invisible, while overhead, far down the cliffs of Roraima, grey clouds lowered, as if they would burst upon the huts and destroy them at any instant. Eventually, however, a fine day came. The sun shone once more, and his rays scintillated on the backs of the humming-birds. With happy hearts the little party assembled, rapidly made the traverse of the forest, crossed the talus to the foot of the ledge, and began the attack on Roraima in earnest.

Climbing over the rough lower ground, with its broken rocks and its tangled brambles, and keeping close to the outer or cliff edge, they steadily rose along the ledge until they were more than a thousand feet above the tree-tops, and had a wonderful view of the forest below. At this point the ledge fell away abruptly, but on approaching the edge, they found that a natural hollow had been worn in the cliff by the fall of a stream which, tumbling over the cliff above, fell as fine spray on their heads. By an easy slope it was possible to get down beneath the fall, and to pass across to the other side, beyond which the prospect seemed more doubtful.

Descending into the hollow, they were immediately lost to one another in grass more than six feet high. On emerging from this, they had to glissade over the slippery water-soaked, moss-covered rocks beneath the fall, avoiding the softest patches, and then to climb a very steep, greasy hill to the ledge again. Had there been much water coming down, this would have been impossible.

Once on the ledge again, the rest proved easy. The way up was twenty feet wide, and covered with curious

202 Modern Exploration — Triumphs

plants. One in particular, a *Brochinia*, had its leaves so arranged as to resemble cups, holding large quantities of water; and over masses of this plant they went, squelching in the wet continuously. Another plant, rosette-shaped, had long needle-like spines which were reputed to be poisonous, and were accordingly treated with much respect. There were also patches of heather with beautiful dark green leaves and brilliant crimson flowers, besides large pitcher plants and other strange things.

A short climb, an involuntary catching of the breath, and the top of the mysterious mountain was theirs. What would they find there?

The reality surpassed anything that they could have imagined. The top was not flat at all. A sandstone wilderness, 8600 feet above the sea, it had been played upon for ages by wind and rain, and had been worn into the most extraordinary formations, some of them far larger than a house. Here was a church, complete with stumpy steeple; there an overlapping mass that looked like nothing more than a huge mushroom. The fancy saw in other curious rocks resemblances to animals, houses, castles; but all was absolutely barren, except for a few stunted bushes in sheltered spots. Between the rock masses stretched little sandy plains, rivulets of water, tiny cascades, and miniature lakes. Over all there hung a mysterious stillness, as of death; only the tinkle of the water and the remote sigh of the wind broke the silence. A mist, which never seemed far away, wrapped first one and then another of these curious rocks in its cold embrace, giving to the whole place a sense of vastness and desolation. So huge was this plateau that the party could not possibly explore more than a fraction of it, nor did they dare to go far, for nothing would have been easier than to have been lost there completely.

After boiling water to find the height of the summit,

The Conquest of Roraima 203

and collecting specimens of the few plants which were visible, im Thurn returned to his camp. Shortly afterwards it was broken up, and thanks to the dépôts which had been laid by his forethought when going out, the return journey to the coast was made easily, and without incident.

Upon arrival in civilization, however, im Thurn became seriously ill, as a result of the hardships which had to be endured on this trip; but he recovered, to live for many years in the somewhat enervating heat of British Guiana, to be knighted, and to do yeoman service in other parts of the British Empire.

CHAPTER III

Sir John Murray, and the Bottom of the Sea

Just ninety years ago there was born at Coburg, Ontario, a boy who was destined to have an enormous influence upon certain branches of natural science; his name, John Murray, is a sufficient indication of his ancestry. At the age of seventeen he was sent to relatives in Scotland, where he studied at Edinburgh University. Short, thickset and strong, young Murray had imbibed from childhood a contempt for regular or orthodox studies, and examinations meant nothing to him, so that he never entered for them. He was, however, industrious at whatever subject caught his fancy; and his clear thinking and original views made him a notable figure in New Athens. On and off he spent the fifteen years, until his thirty-second birthday, at the University, without, however, becoming one of the recognized staff.

At this period—in the early 'seventies—it was beginning to be realized that beneath the restless surface of the sea dwelt a vast marine population in an almost wholly unknown world. The first Atlantic cable had been laid (from Valentia Island to Newfoundland) in the year of the Indian Mutiny; and new lines were now being projected between many places. In order to lay the cables successfully it was essential to have some idea of the submarine relief, as well as of the nature of the bottom;

but at that time such information was available only for the merest fraction of the ocean. Recent expeditions, and especially three small cruises by the *Lightning* and *Porcupine* in 1869-70, had shown that a strange and wholly unexpected fauna dwelt in the sea; and this scientific novelty whetted the curiosity which commercial motives had aroused. The United States contemplated a large-scale expedition to study the sea; the French and Germans were also busy; and to cut a long story short, the British Government decided to take the lead by sending the *Challenger*, a steam corvette of 2300 tons, with a naval crew and officers, and carrying civilian naturalists on board, upon a three years' survey of the ocean depths.

Thus was this famous cruise initiated. The ship was commanded by Captain (Sir) George Nares. The chief naturalist was Professor Wyville Thomson, of Edinburgh University. He had five assistants: the last place, becoming vacant by chance, was offered to John Murray, who thus had his life's work thrust upon him.

Besides ascertaining depths and currents the vessel was to visit remote islands, to collect plants and birds, to make hourly meteorological observations, and to glean all sorts of useful scientific knowledge.

Seeking for what lies within the sea is like reaching out one's hand for a thimble on the floor of a swimming bath which is filled with ink. Chance plays a great part in every capture, for nothing can be discerned until, by some means or other, it has been brought to the surface.

The first and most important point was sounding. It would appear to be the easiest thing in the world to sling a line and weight overboard, and to measure its length when it reached the bottom. In practice, however, it was learned that currents drifted the line away, even though the ship was held stationary, for at various depths

206 Modern Exploration — Triumphs

in the sea are currents which often run quite contrary to one another. Thus, it was never certain when the bottom had been reached, and sometimes many miles of line were actually paid out without finding it simply because a current had got hold of the rope.

To remedy this state of affairs Midshipman Brooke, of the U.S. Navy, invented a sounder, to which was attached a weight that was released only when it hit the bottom; while in England, Sir William Thomson (afterwards Lord Kelvin) devised a machine with a brake, which so worked that the line slackened immediately the sounder touched ground. The sounder always comprised a tube in which a sample of mud could be caught and brought to the surface. Various modifications of the Kelvin apparatus have since been made, by Sigsbee, Lucas, and others, but the principle remains unchanged.

Then again, it was very desirable to know how the inhabitants of this marine realm lived. Imagine a world of water, most of which is three miles or more high (i.e. deep), and in which multitudes of animals dwell, mostly at the top but some at intermediate levels, some just above the bottom, and some on the bottom. Do they all live under the same conditions? Is there any light down there? If not, how do they find their way about? All these and other fascinating questions were awaiting an answer when the *Challenger* sailed.

Thus, it was necessary not only to sound, but also to pick up samples of sea water from the bottom and from intermediate depths, in order to learn what impurities and gases (especially oxygen) they contained. This was done by means of a stopcock water-bottle, which went down open, but automatically closed on being jerked upwards, thereby entrapping a little water from the appropriate level. The sample was afterwards analysed on board the ship. Special thermometers of various

kinds were also employed for ascertaining the temperature at all levels.

Finally came the inhabitants of the sea. It was by no means certain that anything lived at very great depths; but for the capture of such bottom-living creatures as might exist dredges and trawls were used. These appliances were much larger than the ordinary apparatus with which young naturalists explore the sea-bed near land; for instance, the trawl had a beam 15 to 20 feet long, made of stout wood, the edge of the large net below being weighted with many small rolls of lead.

For examining shallow depths and the surface water tow-nets were hung out, generally at night. When hauled in they contained a mass of uninviting jelly, but what treasures for the microscope were revealed when this was sorted!—young fish in many stages of development, exquisitely beautiful animalcules, diatoms and other plants, and a whole host of extraordinary creatures, so minute that individually they escaped detection in the clear water!

The expedition left Sheerness on 7th December, 1872. Everything being new to them, they were some time in acquiring skill at operating the plant, not to mention the difficulty of accustoming themselves to work upon a rolling vessel in mid-winter. The start, indeed, was distinctly inauspicious. At their first sounding (in the Bay of Biscay) they lost the line, together with a thermometer. At the first dredging the dredge came up empty. The second sounding cost them another line and thermometer. They then fouled the dredge on something, and lost that. Finally, the third sounding also resulted in the loss of everything. After this matters improved; and eventually they became sufficiently skilful to sound in all weathers, and to take dredgings in any but very heavy swells.

208 Modern Exploration — Triumphs

The *Challenger* sailed via Lisbon to Madeira and then to the great volcano of Teneriffe, a huge mountain that is one-third buried under the sea: here the main work was to commence. The essential part of the programme was to make soundings at least once a day.

Sounding took a considerable time, and was usually done early in the morning. For the most part the ship cruised under sail; but in order not to change her position during sounding steam had to be got up each day. The heavy line, with its thermometers, water-bottles and weights, was lowered at 5.30 to 6.0 a.m.; and if the depth happened to be 2 or $2\frac{1}{2}$ miles the sounding took about an hour.

Later, if conditions were favourable—that is, if the ship were not rolling so that her decks stood at all angles to the horizon—the dredge or trawl was got out, with a long iron bar behind the bag, to which several coarse swabs were attached, so as to entangle any rough or spinous creatures. Being slung out about 200 yards behind a heavy weight the apparatus was slowly sunk to the bottom, and a large amount of slack rope paid out. The ship then drifted for a time; after which the whole outfit was slowly and carefully hauled in. Despite all precautions it often came to the surface upside down and empty, while it sometimes caught on rough obstructions on the bottom, or became entangled with the weights, and was lost.

The first hauls with the dredge were very disappointing. They brought up great masses of sticky clay, all of which had to be carefully washed through a sieve in order to discover whether it concealed any living thing; and the result of a whole afternoon's work would be a few deep-sea shrimps, an occasional curiosity like a new type of sponge, and some fragmentary worms!

Subsequently they used the trawl (which sweeps the



E 568

H.M.S. CHALLENGER

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bottom much more lightly than a dredge), and the character of the catches improved.

You can imagine the interest with which the early haulings-in were watched: the strain on the rubber accumulators, the dripping rope winding round the capstan, the appearance of the frame at the surface, the sigh of relief with which it was seen to clear the water (always a risky moment, because the apparatus then doubles its weight), and its lowering on deck, the haste to undo it, and the care to prevent small crabs and other nuisances from running all over the ship! Once or twice during the voyage they had the most cruel of setbacks, the net and its contents just appearing awash, only for the rope to part and the whole lot gracefully sink out of sight again! It was declared that the rarest and most valuable organisms were in these lost dredgings! As time passed, however, and the novelty of the work wore off, the interested spectators dwindled to nil, only those attending whose special business it was; but Wyville Thomson, who retained his keenness throughout the three and a half years' cruise, never missed a dredging.

Of course, one cannot hope with dredge or trawl to catch large marine animals, except by the greatest good luck, and fishes, in particular, nearly always get away; so much so that it became a joke among the *Challenger's* crew that the naturalists could catch everything but a square meal! When off Nova Scotia, however, they made a rich haul of delicious cod, which to some extent compensated for their former deficiencies.

Off Cape St. Vincent they caught their first deep-sea fish—a rat-tailed, triangular little object, only a few inches long, and in a pitiful condition. At the bottom of the sea all animals necessarily live under the pressure of the overlying water, a block of which one square foot in area and one foot deep weighs about 64 lb.; the immense

210 Modern Exploration — Triumphs

pressure compresses the gases in the creatures' bodies. When this fish came up, the expansion of its gases resulting from the removal of the pressure had blown its eyes nearly out of its head, and had forced its internal organs out through the mouth. Later captures were generally in a similar condition: only rarely were they even presentable, and very few indeed were fit for museum specimens. On the other hand the sponges, sea cucumbers, deep-sea corals, deep-sea shrimps, even the delicate worms that dwelt in the utter darkness two or three miles, or even more, beneath the surface, were largely perfect. As a rule, however, owing to the reduced pressure, they either died on the way up, or could not be kept alive more than a few hours.

After staying a week at Gibraltar, the *Challenger* went to Madeira, and then to the noble volcanic island of Teneriffe, where the intention was to climb the peak, collecting its plants, while a pinnacle sounded the shoals round the island. Owing to the early season this project fell through. Like many another oceanic volcano Teneriffe is partly buried under the sea; for although its exposed portion soars grandly into the sky for more than 12,000 feet, its roots go down beneath the waves for another mile and a half; so that, could we but remove the water, what an awe-inspiring mass this would be!

From Teneriffe the expedition crossed the Atlantic to the West Indies, on a course where ordinary ships never sailed, and meeting no other vessels—sometimes not even seeing a bird—for days at a time. They passed through the Sargasso Sea, which is commonly imagined by young people to be a stretch of slimy, still water, where deserted hulks lie rotting, their chains rusted away, their timbers covered with weeds, crabs and barnacles; here, pirates might conceivably have their lair. Alas for this pleasant fiction. The Sargasso Sea is two to three miles deep;

and is simply a large oval part of the ocean around which currents sweep in curves, sloughing into it masses of *Sargasso Weed* that grew originally in the Gulf of Mexico. The seaweed collects into patches of yellowish-brown, from a square yard up to an acre in area; and upon it, as well as beneath its sheltering fronds, a great number of small oceanic animals make their homes. Lanes of water of the richest blue separate these floating islands.

Murray was sent out in a boat to examine the weed. Encrusting organisms marked it with white patches, and all the animals dwelling on it simulated the same colours, especially a tiny crab which so perfectly resembled the weed that it could be detected only when it moved. Murray took one of these crabs, placing it in a different position several times; on each occasion it returned to its original site, as if conscious that there alone lay safety. Here they also found one of the very few fishes that make a nest—a little thing, of extraordinary shape and markings, called *Antennarius*. The nests, which contained the eggs, were round, resembling cricket balls, and were composed of threads manufactured by the fish.

In this part of the ocean the *Challenger* people had a remarkable proof of the great pressure at the bottom; for even from a depth of less than $2\frac{1}{2}$ miles the trawl came up with its beam twisted, the wood being compressed by half an inch, so that the knots stood out beyond the general surface.

The West Indian coral reefs, especially those of Bermuda, gave the naturalists their first taste of the beauties of a tropical sea. Armed with a water-glass (which is simply a plain tube, to shut off a portion of the surface water and stop it from moving) one could see the bottom clearly, even at a fair depth; and the many kinds of corals—some knobby, with green, brown, and red polyps, some whiplike and iridescent, some like beautiful jewelled

212 Modern Exploration — Triumphs

fans swaying with the tide—formed an exquisite picture. In and out among the waving shapes darted crowds of gaily-hued little fishes, many of which fed on the corals; large helmet shells, tiger shells, and others, all arrayed in gorgeous coats of many colours, nestled in the crevices or crawled slowly about among the weeds; cream, terracotta, red, green, speckled and banded sea anemones, the flowers of the ocean, completed the picture. The water had almost the green hue of a swimming bath, except that it was marked by ominous dark purple patches where the reefs rose. Farther out one might discern the fin of a shark, or be startled by a sudden splash as flying fishes leaped out of the water to escape pursuit, perchance only to fall straight into the waiting jaws of another foe. Falling like stones from the blue, fishing-birds dropped straight as a plummet into the water, presently to emerge dripping, with fishes in their beaks.

At all the islands on her route the *Challenger* stopped, while botanical and bird collections were made, ceremonial visits undergone, and a little welcome exercise enjoyed after the long spells of rolling ocean. Meantime, the pinnacle dredged and trawled in shallow water, usually with Murray in charge.

From Bermuda the ship sailed north to Halifax, Nova Scotia, and back again, during which time they crossed the Gulf Stream on several occasions. The Gulf Stream is like a river of very salt water, running in the ocean, and at times its deep-blue colour marks it off from the inshore seas with wonderful abruptness. It runs at from one to four miles an hour; and in this connexion the voyagers had a singular experience. The ship hove-to for a sounding; but so strong was the current that she had to steam against it at a corresponding rate in order to maintain her position, and while the vessel did not move the water rushed by her like a river.

The difference in warmth and saltness between the Gulf Stream and the adjoining seas is fatal to many creatures every year; for the Stream, having no banks, alters its position at the will of the winds and barometric pressure. Such a phenomenon apparently caused an extraordinary destruction of tile-fish a few years after the *Challenger's* cruise, when millions of dead and dying fish lay scattered over the surface for hundreds of square miles.

From Bermuda the *Challenger* went east again to the Azores and Madeira, then southwards across the Equator. Off the Canary Islands they encountered some very extraordinary polyp animals, of which the Portuguese Man-of-War is the type. They are gelatinous, with a float composed of one or more air-filled chambers, beneath which is an arrangement of swimming-bells. The float is usually at or near the surface. Underneath it there trails a greater or less extent of "fishing line" comprising long serpentine threads, each armed with a feeding polyp, and with thousands of stinging cells that can severely injure even a man. The threads vary in length from a few inches to fifty feet, or even more; the larger ones are among the greatest dangers of the ocean. Serenely the animal floats along, dragging its deadly tangle behind it, and woe betide the small fish or other prey that comes within touch of the countless stings!

Stopping to examine St. Paul's Rocks, a tiny bit of land in mid-ocean, barely above the spray, and largely made up of guano, they next made sail for Fernando Noronha, a grim rocky penal settlement off the Brazilian coast. Here they found the convicts enjoying great liberty, tilling their own gardens, and forced only to supply a certain proportion of labour to the government; while the governor of the place rested secure in the certainty that none could escape. He was a surly man

214 Modern Exploration — Triumphs

who forbade our naturalists to make collections, and since that had been the object of their call, they got under way once more for Pernambuco, and then passed down the South American coast to Bahia.

In this stretch they met their first sperm whale, the true lord of the sea. Sperm whales wander about in pairs, or even singly, and are feared and dreaded by sharks and even by their pugnacious smaller relatives, the Grampus, or Killer-whales, which they will toss in the air with one grand sweep of the mighty tail, and dexterously bite in two as they descend. Certain sharks, however, combine in packs like wolves to attack them, and then it may go hard with the whale; even this greatest of animals is not immune from a violent death. Moreover, every whale carries about with it such minor inconveniences as clusters of barnacles and other growths; many of them are also infested by more unpleasant parasites.

Sharks are among the few large creatures to be found far out at sea; where they wander other fishes speedily make themselves scarce. The *Challenger* repeatedly caught sharks to which sucker-fish were attached; small brown creatures, they had the dorsal fin modified into a sucking pad on top of the head. They hung on to the shark upside down, doubtless getting a certain proportion of its victims; and so tenacious was their hold that they suffered themselves to be drawn out of the water along with the expiring monster.

The naturalists also noticed a turtle swimming boldly in the open ocean, 300 miles from the nearest land.

They were greatly charmed by the frequent appearance of phosphorescence at night, in this and other tropical seas. It was very largely caused by *Pyrosoma*, a jelly-like organism, which emits a brilliant blue or green light. One huge specimen, four feet long, was placed in a tank;

a naturalist wrote his name on its side with his finger, the letters glowing like blue fire for nearly half an hour afterwards.

Many other marine creatures possess these natural lights, especially deep-sea fishes, which have on their sides regular patterns that one may fancifully compare to the portholes of a liner. The lights are of different colours and patterns, according to the fish. Sunlight penetrates but a very short way beneath the surface, the great bulk of the ocean being continuously dark. By means of its luminosity the deep-sea fish can distinguish friend from foe, can light up the sea-floor, and can attract its prey. Some even have the front fin modified into a luminous feather, which waves in front of the head after the manner of an angler-fish's bait; suddenly the great mouth-slit will close cruelly upon the victim whose curiosity has been aroused by the light. Most of these deep-sea fishes are peculiarly hideous, having either no eyes or extraordinarily large ones; while their teeth are prominent and incurving. There is so much difficulty in catching prey that no chance must be left of its wriggling away, once it is between the ferocious jaws!

When near Bahia the *Challenger* had the unusual experience of a shower of butterflies, pretty little things, all of one kind, and so numerous as to resemble a snow-storm. But what a nasty, sickly mess they made when their multitudinous bodies covered the decks, and were involuntarily trodden underfoot! Such showers are not uncommon in this region, the young butterflies being caught by a land wind when on the wing, and blown off-shore; scarcely any survive to return with the evening breeze.

After they had remained some time at Bahia one of the seamen contracted yellow fever, so the ship made a hasty departure, leaving him behind. Minor fevers broke

216 Modern Exploration — Triumphs

out on board, but fortunately they were soon dispersed; and the ship again had a clean bill of health when she reached her next halting-place, the lonely island of Tristan d'Acunha. Here the *Challenger* people learned of two Germans who had led a most extraordinary life, and it was resolved to take them back to civilization. This is the story, as Sir Wyville Thomson tells it.

They were brothers, by name Frederick and Gustav Stoltenhoff. Gustav (the younger) was a sailor whose ship caught fire and sank near Tristan d'Acunha some years before; and he, with one boatload of survivors, was well treated by the islanders until a ship took them home.

He had learned that Inaccessible Island, a rock about 100 miles from Tristan, was a good breeding ground for seals, and he determined to go back and exploit the knowledge. On reaching Germany he found his brother newly discharged from the Franco-German War, out of work, and ready for adventure. Accordingly they got themselves conveyed to the South Atlantic, and were dumped down on Inaccessible Island rather more than two years before the *Challenger* visited it.

They were typically German in their thoroughness. Their equipment included an old whaleboat, with mast, sails, and oars. They took three spars to make a roof for a house, a door, and a glazed window. They had a wheelbarrow, two spades, a few other useful tools, a kettle and a frying-pan, crockery, blankets, a lamp, and six dozen boxes of Bryant and May's matches. For food they took 200 lb. of flour, the same of rice, half as much biscuit, 20 lb. of coffee, 10 lb. of tea, sugar, salt, pepper, tobacco, wine, gin; two guns with ammunition were intended to provide them with fresh meat. They also had sheath knives, seeds of vegetables, seed potatoes, and a few books, and with this equipment they started their Crusoe-like career.

At first the inhabitants of Tristan, who themselves went sealing on Inaccessible Island, helped the adventurers. The Germans erected their hut in a cove that was sheltered from the wind, but wholly enclosed by cliffs; one could, however, climb up to the plateau which formed most of the island, by hanging on to the tufts of coarse tussock grass. Up there a number of wild pigs and a few goats roamed, and these were killed indiscriminately by the brothers Stoltenhoff and the Tristan people, as need arose.

The brothers killed a few seals, but had no means of extracting much of the oil. After a few months the boat was accidentally damaged; so they cut her in two, and used the worse half to patch up the better. During the winter they shot a few goats and pigs, on which they lived, together with their supplies.

Life now became much harder for them. After they had been on the island six months they accidentally set fire to the tussock grass in the cove; it flared up and was destroyed, and with it went their only means of getting out of the cove by land. The patched boat, too, went to pieces in the rough surf, so that whenever they wanted to leave their home they had to swim. During that winter they were half starved, besides suffering much from the lack of variety in their food.

The next summer the Tristan men, who probably resented their long stay, set bounds to its duration by killing all the remaining goats, and during the second winter the two brothers had an even harder time. Forced to swim whenever they wanted meat, they decided to move; but in doing so many things were perforce left behind in the cove. A ship appeared at last, but unfortunately, at about that time a swarm of penguins settled on the island and the brothers refused the offer to take them off, being sanguine enough to think that they could

218 Modern Exploration — Triumphs

live on penguin eggs while their prospective fortune in seals accumulated. Naturally, the result was that when the *Challenger* people picked them up they were mere skin and bone, and heartily glad they were to see the last of Inaccessible Island.

Pursuing her leisurely course to Cape Town, the *Challenger* arrived there just a year and ten days after her departure from England. She was crowded with captures made by dredge, trawl, and tow-net, besides plants, birds, and other specimens. It fell to Murray's lot to catalogue these, with all the careful marking so necessary in order that they should not become mixed; and while the ship was at Cape Town he packed up the collections, in sixty-four large cases, and they were sent home. He must have felt a thrill, at times, in thus handling one by one all the precious results of their many hauls.

From South Africa the expedition was destined to wander over the vast, lonely and constantly stormy Southern Ocean, before doubling back upon Australia. The ship touched at several lonely, cold and uninhabited islands—Marion Island, the Crozets, and Kerguelen. In these seas life was more prolific even than in the tropics; but of course it was of a different kind, and it furnished them with many an interesting capture and still more interesting discussion.

At Kerguelen, in particular, they secured large numbers of sea spiders—extraordinary animals, not in any way related to ordinary spiders, but somewhat resembling them externally, having the same small bodies and immense legs. Some of these ugly creatures measured two feet across.

Soon after leaving Kerguelen the lookout shouted "Ice ahead!" and everyone rushed to the rail to see. There before them floated a huge tabular iceberg, glitter-

ing coldly in the pale blue southern sky, with deep blue and green hollows where caves or fractures lay, a glorious but menacing picture. It was more than 200 feet high and nearly half a mile long. Bergs of this kind soon became a common sight, and dozens were frequently visible at once. Numerous whales also appeared, including the large finback whale, which congregates in thousands in Antarctic waters.

The *Challenger* crossed the Antarctic Circle, but was soon forced aside by the edge of the pack—a vast expanse of grinding, pancake-like ice floes, which stretches between the stormy ocean on the north and the smaller areas of open water near Antarctica. Throughout this part of the voyage the dredgings revealed a wonderful abundance of living things; the life, however, was sometimes more prolific than agreeable. For example, some patches of sea were almost brown with a slimy evil-smelling scum: on examination, it proved to be the decomposing bodies of countless millions of diatoms, those tiny plants whose pillbox skeletons form such exquisite objects for the microscope.

On leaving the Antarctic the expedition made for the more genial climate first of Melbourne, and then of Sydney; and at Sydney they had their first real leave, staying there three months. Meanwhile all the Antarctic collections were packed up and sent home; a job that must have taken Murray a considerable time, for they fully equalled those collected during a whole year in the Atlantic.

The greater part of the long cruise, involving continuous and exhausting work, now took place in the tropical and sub-tropical Pacific. From Sydney they went to New Zealand, then to Tonga and Fiji, and back again to Torres Straits: so prolific was the life at the last-named that over 500 different *kinds* of animals were collected

220 Modern Exploration — Triumphs

there in two days. Thence they passed to the Philippine Islands and Hong Kong. Murray had now again to pack all the collections—an array fully equal to the total amount sent home hitherto, much of which was entirely new to science.

The monotony of their work under the hot tropical sun told upon them all; nor had they any encouragement but their enthusiasm and sense of duty; the oily sea, the occasional storms, the rare flights of birds, making a background which, beautiful in itself, palled because it was always the same. Occasionally something curious happened, however. Thus, one day a flying fish, eager to escape pursuit, shot out of the water and straight through a porthole into the *Challenger*, where, of course, it was speedily bottled. At another time, when 74 miles from land, and in water $1\frac{1}{2}$ miles deep, they fished up some coconuts from the bottom; their insides were mostly occupied by small shells, but one was still white and fresh. This freak capture reminds me that another famous oceanic naturalist, Agassiz, once pulled up a dredge from deep water off New York with great skill and caution, as it contained a load, and on sifting the mud found that the precious content was—an old boot!

From Hong Kong the *Challenger* sailed back again to the Philippines and New Guinea, then north to Japan, and at this time she made her deepest sounding, more than five miles; the pressure at the bottom was so severe that the thermometers were all broken. At such a depth the pressure is about 900 times that under which we live, and yet the softest of animals not only endure it, but appear to thrive in it. At great depths the number of specimens was always fewer, but their variety was surprisingly great—red and black shrimps, numerous extraordinary fishes, some extremely fine sponges, strange worms and other things.

From Japan the expedition crossed the vast bosom of the Pacific, by way of Hawaii and Tahiti to Valparaiso. During this time Murray developed an interesting theory on the origin of coral reefs, which created much attention for some years, but is not held of great account now. A serious blow at this time was the death, from erysipelas in the face, of Willemoes-Suhm, one of the naturalists. He was a popular and industrious young man of much promise, who had won his way into the hearts of all on board.

Shortly after he died the ship dredged in extremely deep water, and brought up whole loads of whales' earbones and the teeth of sharks; the latter, in particular, were of very ancient types, looking as if they might have belonged to fishes that swam in the Pacific ages ago.

Before leaving the Pacific they called at Juan Fernandez, Robinson Crusoe's island; and then, instead of passing round Cape Horn into the Atlantic, threaded a way among the Chilian islands, past the sombre mainland forests and the savage bays where glaciers stole down to the water's edge, and so bore round to the Falkland Islands and the broad ocean that led home. Every day now added to the congestion on board; but every day, almost without a break, the work went on until they were in the North Atlantic once more, and home became a thing to talk about. Violent storms delayed them considerably, but at last the good ship sighted the Needles, and passed up to Portsmouth on 24th May, 1876, just 3½ years after setting forth. She had covered no fewer than 68,890 miles.

The real work of the *Challenger* expedition now began. All the hundreds of cases, with their thousands of jars and dried specimens, had been temporarily stored in Edinburgh. A government office was opened there, under Sir Wyville Thomson, with Murray as his assistant, and

222 Modern Exploration — Triumphs

here the collections were unpacked and sorted. The out-turning provided them with many an anecdote, as the removal of sawdust and shavings revealed first one curiosity and then another, each a reminder of some far-off sea.

It was early realized that the collections would take much time and many hands to examine thoroughly. Unhappily, Thomson fell ill shortly after the return of the *Challenger*, and never really recovering, died in March, 1882.

Meantime, Murray had succeeded him as Editor of the *Challenger* Reports. He allocated the groups of animals to different naturalists; examined the drawings that were intended for publication (for several figures were required of each species, as a rule); read the immense manuscripts; and by his natural energy pushed the great work forward as fast as he could. At last all the results were published in forty-eight large volumes, the work of seventy-six different scientists, and of a host of artists. This was in 1891. The long delay, the consequent loss of public interest, and a passing phase of economy, forced the Government (who had already spent nearly £190,000 on the *Challenger* cruise and its aftermath) to refuse to publish what Murray considered as essential, a summary of the whole; so, characteristically, he threatened to do it out of his own pocket. A compromise was arranged at the last moment; and two final volumes, containing an invaluable summary of the work, were published in 1895. The story was complete.

Murray (who was made an LL.D. and F.R.S., and was subsequently knighted) himself created one entirely new science, that of deep-sea deposits. All the hundreds of samples of the bottom, together with many collected by other expeditions, were analysed and microscopically examined by him, in conjunction with his friends Robert

Irvine and Professor Renard, and the results noted down by his assistant James Chumley; and it was now shown for the first time that the ocean bed was composed of several different kinds of deposits: in intermediate depths ooze made up almost wholly of countless microscopic shells from the surface, and in great depths featureless plains of red clay.

Long before the editing of the *Challenger* Reports was completed, Murray's love of the sea had found another outlet. He made two small expeditions to the north-west of Scotland, proving the existence of a buried ridge separating the deep, cold Norwegian Sea from the warmer North Atlantic: this, the Wyville Thomson Ridge, owed its discovery to the man whose name it bears, and who, too ill to participate in the work, watched the ship depart from the Shetland Islands.

Later Murray acquired a small yacht in which he cruised and dredged among the Scottish sea lochs. He also built a floating laboratory upon an old canal barge, which was aptly named the Ark, and which was anchored in a picturesque little quarry on the Firth of Forth, flooded at high tides. Far more important work was to come.

Among the Antarctic dredgings of the *Challenger* were certain rocks which only occur on continents, and this led Murray to postulate the existence of an Antarctic continent, although at that time nothing whatever was known definitely about it. He started the rolling of the ball of inquiry by a paper read before the Royal Geographical Society. Sir Clements Markham, subsequently President of the Society, took up the matter with enthusiasm; and there eventually resulted another great national expedition, that of the *Discovery*, under Captain Scott. During her long sojourn in the Antarctic large areas of the continent were visited for the first time. A

224 Modern Exploration — Triumphs

little earlier the same impulse had directed other ships to South Georgia and the South Shetlands, one of which resulted in the loss of the vessel.

During this period of his life Murray's energy was inexhaustible. This man, who in his youth had been unable to concentrate sufficiently on anything to qualify for a degree, successfully carried through one of the most tedious jobs imaginable: he divided the whole ocean surface into small squares, each of two degrees, and by collecting thousands of observations which had been made for nearly half a century by many ships, he made the first real temperature charts of the sea.

Meanwhile honours showered upon him, but he seemed to care but little for them, and throughout remained the same blunt, uncompromising, hardheaded Scot.

In 1897 he began a project that had long been fermenting, no less than a survey of all the 567 principal Scottish lochs: sounding their depths (which sometimes reach far below sea-level) and making many other observations. This work was carried steadily through to its completion in 1909. The highlands are by no means constantly kind in the nature of the weather they dispense amongst the lochs; but were it fair or foul Murray was to be found on one of them, along with his friend Mr. F. P. Pullar, armed with water-bottles, a portable Lucas sounding machine, samples of the bottom, and collections of the living things. His first coadjutor in the work, Mr. Laurence Pullar, sacrificed his life in trying to save another person, and was drowned. Such were the types of people by whom Murray was surrounded, and on whom he exercised such a notable influence.

In later years his mind constantly wandered back to the Pacific, where he projected another expedition, but the great expense as constantly prohibited it. However,

in 1910, he made arrangements with the Norwegian Government to lend him the *Michael Sars*, a fisheries steamer of only 226 tons, under Captain J. Hjort, and in this small craft they not only traversed the length and breadth of the North Atlantic for four months, but made exceedingly valuable researches, trawlings and current observations. One great aim of the expedition was to prove the existence of life in the intermediate depths of the sea; and this was done by means of nets towed at different levels down to about two miles, as many as ten nets being successfully carried on a single line. The results of the expedition came out in 1912, in a fascinating volume, *The Depths of the Ocean*. Murray was now in his seventieth year; a pretty good age at which to subject oneself to the buffetings of the stormy Atlantic.

He remained hardy and alert to the end, being killed instantaneously in a motor-car accident, on 16th March, 1914. He was in his seventy-fourth year.

One of the strangest inhabitants of that realm which Murray searched so often and so successfully is the Giant Cuttlefish, a horrid, cartilaginous mass, generally resembling a huge octopus, but having, in addition to its eight ordinary "arms", two long tentacles, capable of contraction, and bearing at their ends thick pads armed with suckers and vicious hooks. These tentacles alone may be thirty feet long, or even more—i.e. equal to the height of a suburban house; while the monster's ordinary "arms" are eight or ten feet long, and its sac-like body adds another six or eight feet.

The Giant Cuttlefish is sufficiently powerful to prey upon all marine animals other than dolphins and porpoises, large sharks, and whales. A man caught by one would be powerless to resist, and would be torn to pieces by the hooks, or ripped up by the animal's parrot-like jaws. One of these horrors was found asleep off New-

226 Modern Exploration — Triumphs

foundland many years ago, and was unwittingly struck by a boathook. Roused to fury, it flung its gigantic tentacle right round the boat, and would have pulled it under had not the occupants hastily slashed it off with a knife. The broken tentacle was twenty-four feet long, and is now in the British Museum.

These monsters have one inveterate enemy, the whale. The cuttlefish usually live at some depth; but the whales dive down, and either swallow them whole or cut them to pieces.

For fishing the bottom the dredge and trawl are of course essential, and will always be employed in some form or other; but for sounding the old methods of the *Challenger*, and even the improvements made by the *Michael Sars*, are now obsolete. During the Great War it became necessary to have an apparatus which could detect submarines by sound, whence came the Admiralty idea of making soundings by echo. There are several good echo sounders now in use, the apparatus being fixed in the bottom of the ship. A hammer, electrically operated, and working in a chamber that is almost soundproof so far as the ship is concerned, transmits a sound to the sea-floor; the echo is reflected back, the time of transmission being noted. Sound travels in sea-water at about 800 feet per second; therefore, by simply dividing the time interval by two one gets the depth, a labour, moreover, which is done by a scale and pointer attached to the instrument.

Many vessels, both in the Navy and the Mercantile Marine, now carry echo sounders, for they enable the navigator to ascertain the amount of water under him almost instantaneously, and without checking the ship's speed. The old-fashioned lead and linesman have gone the way of the barque and the brigantine.

CHAPTER IV

Perseverance Peary

Modern Arctic work north of America started with Parry's four expeditions between 1819 and 1827, during which much of the Canadian Archipelago was discovered, and the high latitude of $82^{\circ} 45'$ reached, only 435 geographical miles from the Pole. Ross extended this work, besides discovering the North Magnetic Pole; while Sir John Franklin, by his quest of the North-west Passage in 1845-8, gave an enormous impetus to Arctic research, though at a terrible cost. After frightful sufferings he and all his men perished, and as nothing was heard of them repeated relief expeditions were sent out in search of them, by the British Government, by Lady Franklin privately, by the United States, and by other sympathizers.

The first important result was that a British search-party, under Sir Robert McClure, discovered the N.W. Passage in 1852; but nothing was learned of Franklin; and after several attempts the British Government, to its eternal disgrace, left him to his fate. It was now that the heroic Lady Franklin arranged for yet another expedition to go north in search of her husband, the vessel being the *Fox*, and her commander Sir Leopold McClintock. Short, stocky, and taciturn, McClintock was a man of inflexible courage, and when his ship was beaten and battered out of Davis Straits, he simply turned her back again, with the quiet command, "Northward ho!" He discovered relics of the Franklin disaster, besides making some wonderful sledge journeys; in

228 Modern Exploration — Triumphs

fact, the British sledging of this expedition, and especially Lt. Mehan's party, surpassed anything that has ever been done by men not assisted by dogs—not even excepting Scott's work in the Antarctic.

In the meantime Elisha Kent Kane, an American, had also been engaged in the Franklin search. He went farther north than the British, keeping up the Greenland coast through Smith Sound to the Kane Basin. Although unsuccessful in his main purpose, he greatly advanced our knowledge of that region. This expedition covered the years 1853-5, and involved some loss of life and much hardship.

In 1862, another American, the unfortunate Hall, followed Kane's route in the *Polaris*, and finding an opportunity of getting through the ice in the Kane Basin, he forced his way past Kennedy and Robeson Channels into Lincoln Sea, finally attaining $82^{\circ} 11'$. Unhappily he died there, but his crew, after losing their ship and undergoing on the ice-floes adventures which fully equalled those of Shackleton's men after the *Endurance* sank in 1915, were providentially drifted on to the Labrador coast, and saved.

In 1875, Sir George Nares, who had given up the command of the *Challenger* in order to undertake Arctic work, was sent north with the *Alert*. He followed the routes of Kane and Hall, and like the latter succeeded in getting the ship through the narrow northern channels into Lincoln Sea. During the subsequent journeys Lt. Aldrich reached $82^{\circ} 48'$, while Commander (afterwards Sir Albert) Markham pushed out towards the Pole through the terribly hummocky ice, and attained the then farthest north of $83^{\circ} 20'$. Much useful mapping was done, and this expedition, despite very great sufferings, was by far the most successful until Peary came on the scene.

The route of Smith Sound being now well recognized, the United States sent Major Greely there in 1881-2. He also penetrated to Robeson Channel, on the Grinnell Land shore of which he established a permanent land base, Fort Conger. We shall hear a good deal about Fort Conger later. By the sledge parties under Lockwood and Brainard $83^{\circ} 24'$ was attained, thus they slightly surpassed the British achievement. Of more importance was the tracing of the Greenland coast round for a good way towards the north-east, but that huge icy wilderness was not yet shown to be an island though the probability was suspected.

This was the position when, in 1886, Robert Edwin Peary made a summer trip to the west coast of Greenland, and thereby settled his own destiny and that of North Polar exploration.

Peary was born at Cresson Springs, Pennsylvania, on 6th May, 1856, and was trained for a surveyor, his college's name being perpetuated in Bowdoin Bay, Greenland, where he spent many a weary day. He started his career as a civilian, but eventually entered the U.S. Navy Yard. Tall, of rather spare build, and with intense determination and an almost inexhaustible reserve of physical strength, he was admirably fitted by nature for a roving life; and in 1885 we find him in the mosquito-haunted jungles of Nicaragua, as assistant surveyor on the Ship Canal project for joining the Atlantic and Pacific Oceans. Then came the Greenland trip, a holiday affair; and then, in 1887, he was back again in Nicaragua, this time in charge of the ultimately abortive project. The cold, sharp breath of icy winds, however, had touched his cheek, and the enervating south no longer held any charms for him.

As you probably know, Greenland is green only in name; except for a few Danish and Eskimo settlements,

230 Modern Exploration — Triumphs

and a few oases in sheltered places, its coast is made up of rugged mountains and inaccessible cliffs, while the whole of the interior is buried under a shield-shaped ice cap, reaching more than 10,000 feet above the sea in places, and probably more than a mile thick.

Peary's 1886 trip was to the principal settlement, Disko Bay, whence he advanced some way into the icy desert, reaching a height of 7500 feet, and experimenting with the conditions of travel. On his return he planned several further journeys, all designed to define the limits of the ice cap, and particularly to cross from the west to the east coast. In 1888, however, while he was still engaged on his duties at the Navy Yard, Fridtjof Nansen, a young Norwegian scientist of twenty-seven, who died in 1930, accomplished what had hitherto been considered impossible, by crossing from the east coast to the west, with the certainty of destruction if he failed.

Deprived of the opportunity of crossing Greenland, Peary now turned to a much more arduous project, the proving whether it was an island. At the back of his mind was the idea that if land extended north, via the unknown part of Greenland, the ice cap would afford an ideal route to the Pole; if not, then at least a good northing would be gained by the exploration of it, besides the credit of proving that the huge ice cap was insular. Raising funds by private subscription he obtained eighteen months' leave, and set out on his first big expedition, that of 1891-2.

The ship was an audaciously small one, the *Kite*. At that time, and for some years afterwards, Peary believed in the greater relative efficiency of small parties: the fewer to feed the faster could they move, and the less had they to carry or to shoot. He was also unalterably convinced of the superiority of dogs over men for hauling sledges. Despite the inevitable cruelty, his actions

showed that he loved his dogs, but there is something very fine and noble about the man-hauling employed by such men as Mechan and Captain Scott.

The personnel of the first expedition was rather remarkable. Mrs. Peary went, the first woman of a civilized race ever to brave the terrors of an Arctic night. Peary's negro servant, Matthew Henson, also accompanied him. Henson was a tall, heavily-built young fellow, enormously strong, and possessing unbounded courage, unbounded faith in Peary, and an unquenchable love of adventure. He participated in all the Peary expeditions, and was subsequently described by his leader as the finest Arctic sledge driver in the world. Messrs. Gibson, Astrup, Verhoeff, and Dr. F. A. Cook completed the party. The last-named served with distinction and great enthusiasm; the dark clouds of fraud and falsehood which were to make his name a byword had not yet appeared on the horizon.

Arriving at Smith Sound, and passing the large Eskimo camp at Cape York, they decided to winter on the Greenland coast. A site was found in McCormick Bay, where a warm winter abode was erected, it being named Red Cliff House. Here Mrs. Peary stayed during the longer journeys, though she participated in most of the short trips. Every effort was also made to attract Eskimos to settle in the vicinity.

During the voyage out, an accident which nobody could have prevented deprived Peary of the use of a leg for two months. It was caught between the tiller and the rail, and snapped in two. Dr. Cook set it skilfully, and Mrs. Peary nursed her husband assiduously; nevertheless Peary was confined to bed for a long time, and nearly a year elapsed before the limb became sound again. His introduction to his winter quarters was from a stretcher, to which he had been strapped; the place where he made

232 Modern Exploration — Triumphs

his first painful hobbles bore the affectionate name of Cripple Beach.

After the winter quarters had been erected the most important work remaining for that season was twofold. First, an examination must be made of the edge of the ice cap, and a practicable route found up it to the great white slope inland; and when this had been done, a sledge party with stores to form a *depôt* must go as far north as possible, and dump the stores for the winter, so that they could be used by the sledging parties next year. Secondly, it was vital for the good health of all that as much fresh meat as possible should be killed, before darkness and frost drove the walrus, seals, and hares away.

Peary had already acquired very definite ideas about Arctic travel. He intended to live "Eskimo fashion" as far as possible. His tents, for the most part, would have to give way to the Eskimo snow hut, or igloo; while his clothing would be made, to his own patterns, from reindeer skins, prepared by the most expert Eskimo sempstresses. This was the reason which encouraged him to open up relations with every settlement, especially that at Cape York; he argued that if the people of the country did not know how to live in it, then a stranger would be still less likely to do so. The need for clothing necessarily involved reindeer hunts also.

A party was now sent out to explore the edge of the ice cap, and to find a way up. It was also intended to lay *depôts* on the ice, so that the sledge parties might have less to carry next year. With the best will in the world, however, the *depôt* party could not make much progress; for after a difficult climb to the ice edge, it found itself on a stony mass of boulders and mud, the *moraine*, beyond which deep crevices seamed the icy surface, while temporary lakes and rivers added to the difficulty

of travel. The worst obstacle of all was the wind. Once a man had surmounted the moraine, he stood every chance of having his head blown off. Sweeping down continuously from the high frozen plateau, a biting, killing wind howled against the moraine; and when a storm arose (as happened every few days during the autumn and spring) it was often impossible to move; for the gale tore away everything that rose more than a foot or two above the surface; it swept up the fine powdery snow, blinding anybody who was foolish enough to brave it; snowdrifts buried the sledges; and the roar of the wind made speech impossible. Such were the conditions which gave a rude check to the first proud hopes of 1891.

Meanwhile the leader and Mrs. Peary had gone fifteen miles from the house by water, to see the *dépôt* party on its way. They had a stout little boat, with oars and a sail, and they were accompanied by an Eskimo in his kayak, a queer craft, pointed at both ends, covered with skin, and having a hole that exactly fitted the owner's body. Peary was still a cripple, and after bidding good-bye to the men he returned with his wife to the shore. The two boats were anchored together. A sudden squall now sprang up, and the anchor commenced to drag. It was blowing off the land, and every moment it carried the boat, which had nearly everything on board, farther out into the fjord. Fortunately they had a rope with which they tried to lasso her, but it was not long enough. Had Peary been able to use his leg it would have proved an easy matter to wade out and secure the boat; as it was, he dared not go in, while the Eskimo would not, on account of a racial dislike to swimming. Dr. Cook was in the vicinity, but not within hail. Meantime, the prospect of a fifteen-mile tramp over the rocks appeared to the cripple every moment more likely. However, Mrs. Peary gallantly waded into the icy water, and after two

234 Modern Exploration — Triumphs

or three attempts slung the rope on board. This was a more venturesome action than perhaps you can realize, for immersion in that latitude, with no means of drying oneself afterwards, is a very serious matter, and not to be undertaken except through sheer necessity.

Meanwhile the snow continued to whirl around them, and the wind to get up force. They entered the boat, and pulled her into deep water; then the Eskimo, struggling to step the mast, dropped it right across Peary's broken leg! They now took to the oars, the wind rising all the time, and brought her back under the shelter of the cliffs, when they laboriously made for home.

Dr. Cook now appeared on the scene. This added to their man-power, but did not suffice to get them home. The wind had now become so furious that they could not prevail against it; the boat was hauled up on a little beach, and they crouched under her side, four utterly miserable people, until the next morning, when the storm went down, and they at last got back to the house.

One would have thought that this experience would teach the explorer the need of doing nothing until his legs were sound, but no; his ardour and enthusiasm must take him out hunting, and one day, while still a cripple, he participated in an exciting walrus hunt. Most of the party were in the boat, along with Mrs. Peary, when they unexpectedly ran into a school of about a hundred walrus, huge, ugly, and dangerous beasts, which eyed the boat with malignant glare. Walrus, like musk-oxen, baboons, and many other wild animals which live in herds, are responsive to the will of a leader. If the leader fights they fight, if he bolts they do likewise. The leader of this herd, with a snort and plunge towards the boat, quickly put his intentions beyond doubt, and soon the water all around the little party was lashed into foam, and weird heads with arched tusks gleaming,

emerged from it every moment. They were driven off, however, by a hail of bullets from the Winchester repeaters, Peary taking his part in the slaughter, although he had to lie in the bottom of the boat, while Mrs. Peary loaded the rifles.

The long winter—the first that a white woman had ever spent in such a latitude—passed rapidly and pleasantly enough. Peary's leg mended, and he was able to carry out most of his projected labours. A number of Eskimo families were induced to come over and camp near Red Cliff House, where employment was found for them. Reindeer skins were cleaned, then Peary cut them into the patterns for clothes, which the Eskimo women sewed up. He always declared that without this clothing, prepared in this way, it would have been impossible to brave the terrible conditions of some of the snowstorms and gales. For the men of the party there was too much to do for any feeling of gloom to arise during the long night. Sledges had to be made, loads worked out, and equipment for the journeys prepared. At every opportunity—that is, whenever there was sufficient moonlight to make it possible—Peary ordered practice on snowshoes and ski, so that all might be prepared for the conditions with which they would have to battle inland. Meantime, routine observations of wind, temperature, and tides went on uninterruptedly, and this job was no sinecure, as instruments had to be handled with the bare fingers, in temperatures such that the metal burned as if it were extremely hot. If one's hand touches metal in extreme cold, and is allowed to stay there, the usual result is to pull off the skin.

None of them knew at this time just what conditions they would meet with later, but a spring journey, intended to last only two days, gave them a very good idea. In February, Cook, Astrup, and Peary started out for the

236 Modern Exploration — Triumphs

ice cap on a short journey to observe the rising of the sun, taking only two days' supplies. Properly to appreciate what follows, you must understand that an imperfectly clad man who is subjected to Arctic cold rapidly develops frost-bite, and that after the first nip, if the frost-bite is not rubbed so as to restore the circulation, the area of freezing grows insidiously, with no further pain, so that a neglected frost-bite may readily result in the loss of toes, fingers, or even limbs. Moreover, the possibility of neglecting a few frost-bites is greatly heightened, when one is struggling to maintain one's balance against a furious gale, and to keep the drifting snow needles from completely blinding one.

The sunrise party built an igloo at the desired spot, intending to stay there for the observation, and then return to the house. The igloo was just large enough to permit a man to stand upright within. Its walls, which were made of blocks of snow cunningly dovetailed into one another, rose four feet six inches above the surface, being nine feet long and six feet wide; for the roof (also of snow) the Eskimos use supports of willow or ash, but on this occasion Peary employed the ski runners. The floor was hollowed out one and a half feet below the surface, so as to give about six feet of internal height. During this operation the weather was warm and misty; and when they retired for the night, each man in his own sleeping bag, they removed most of their clothes, and had on only their underclothing.

The wind now began to howl, and to drift the dust-like snow into the igloo, although the entrance was closed by a snow block. Peary awoke at four o'clock in the morning and noticed the snow, but without realizing that anything was wrong he dozed off again, only to be aroused some time later by a dead-weight. Shaking himself, he found that he was almost buried

in drifted snow, an incessant whirring and roaring went on outside, and to make matters worse, there were ominous cracks in the roof. Even as he shook himself into wakefulness the roof came down, and suddenly he became conscious of the cold icy blast, the stinging frost-needles and the dull quarter-light.

His shouts, together with the shock of the collapsing roof, awoke the others, but they were frozen in their bags, and could not get out. Struggling furiously, Peary and Cook broke away the ice from the tops of their own bags, but they dared not emerge, because their clothes were all buried somewhere under several feet of ice and snow, and Peary, for one, was wearing nothing but an undershirt. Their attention was drawn to Astrup, who could not even free his head, so while Cook broke the icicles away, and made a hole through which the unfortunate Norwegian could breathe, Peary rolled over the top of the wall, bag and all, and bumped down heavily on the snow outside. He then rolled round to the shovel, which had been left outside the entrance, and worked his way back to the broken remnant of the wall, thankful for even that slight shelter against the fierce wind. He dared not expose himself below the shoulders, but with Cook's aid and the shovel, the head of Astrup's bag was freed, and the astonished man sat up.

They were now in a parlous plight. Their clothes were deeply buried; it was impossible to stand against the wind; and they huddled together for warmth and comfort under the miserable bit of snow wall, praying for the wind to cease. Of course, they had no food, and there they stayed throughout the day, cold, hungry, and miserable, but forced to keep moving slightly, lest they be snowed up again. Even as it was, both Cook and Astrup got stuck fast once more, and Peary had to go to their rescue. After a time, they dug out a bit

238 Modern Exploration — Triumphs

of pemmican and a few biscuits, and this dry, cold fare formed dinner and supper. Night came on again, bringing no change either in the darkness or in the blinding snow whirls. The wind was so bad that Peary, leaning up against Astrup, had to shout at him before he was heard. While the exhausted men dozed the wind dropped, and it commenced to rain. Here was a pretty predicament! Of course, the drops froze as they fell, and if there were much rain, the precious clothing might as well be beneath an iron sheet, for there would be no hope of getting at it. A more pressing difficulty was the necessity of moving the bags to and fro every few minutes, otherwise they would have been frozen stiff. Providentially, however, the rain soon ceased; and the unfortunate men, in some thirty degrees of frost, made a bold dive into the snow and extricated their belongings; and then had to dress in the open air.

Despite all this they just managed to secure a fine photograph of the sunrise next morning.

After various spring trips Peary, Cook, Gibson, and Astrup started on the main journey to the north-eastern extremity of Greenland, crossing the ice cap. All wore snowshoes or ski, and the sledges were drawn by twenty savage Eskimo dogs, which incessantly fought each other until the strongest or "leaders" had made their title good: only five of these dogs survived the hardships of the long, long pull.

The start was a most unhappy one. With infinite labour everything had been got up to the moraine, and Peary, who set out last, arrived in the middle of a snow-storm, with whirls of powdery fragments rising far above his head, the wind so strong that one had to turn aside to get one's breath, and the snowhouse barely visible. The dogs had broken loose from their traces, and were tearing and eating up everything they could

get at. What was worse, three of them were mad, and were dying from a peculiar and terrible affliction, common in such temperatures. The animal afflicted runs round and round in circles, foaming at the mouth, bloody and torn, until from sheer exhaustion it falls down and dies. Each wild swoop, should it take the dog near another, or near a man, induces it to bite and snap, and the poor brutes frequently have to be shot to put them out of their misery. As to Peary, he found that his broken leg still troubled him, although the injury was almost a year old. The furious storm had imprisoned Cook and the other men in the igloo, and all that he could do was to join them there, leaving the dogs to do their worst.

At last, however, on 15th May, 1892, a start became possible. They commenced the long easy climb to the roof of Greenland, travelling north-eastwards over deep soft snow. Sixteen dogs were still alive, and the sledgometer registered the excellent distance of 20 miles per day. Soon they reached 5000 feet above the sea. Much greater heights lay on their right hand, and were ascended later.

The route was steered by compass. Peary also employed a guidon, or staff and flag, for the wind constantly blew from the interior outwards, so that as long as they kept on the high plateau it made a very useful indicator. On their left hand, receding behind one another into the far distance, a succession of black knobs indicated the landward edge of the cliffs and peaks overlooking Kane Basin; on this side, likewise, were many crevices and summer lakes, besides channels of temporary streams; in order to avoid them the travellers had constantly to bear more and more to the east, where they could obtain a better surface.

When they had covered 130 miles in this way a slow darkening of the sky until it was black with ominous

240 Modern Exploration — Triumphs

clouds betokened a coming storm. The wind, freshening, cast up the snow into little whirlwinds which rose high in the air, and soon made objects more than a few yards distant quite invisible; and then, gathering strength and fury, it began to howl over that icy desert as only a Greenland wind can. The sledges were pulled up, the dogs staked, and an igloo hurriedly built. Crawling into this out of the gale, and fortified by a hot meal, the party braved the storm in true Eskimo fashion. One man, however, had to remain outside, in order to keep the dogs from tearing each other and the equipment to pieces; this duty was taken by each in turn. This gale lasted forty-eight hours without a break. The unfortunate individual who was on guard had to face a terrible ordeal and the danger of freezing to death, while his comrades inside the hut listened, not indifferently, to the terrorizing blasts, and cooked their food, and slept.

After the tedious but necessary business of digging out the sledges had been completed, Peary and Astrup now went on alone, the others being sent back to Red Cliff House.

Peary went ahead, pointing the way, while Astrup strode beside the sledge. When the sun shone the whole surface of the ice glittered like an enormous white mirror, and so fierce was the glare that the men could sleep only by tying dark bands across their eyes. When, however, the sun was obscured by clouds, and storms were blowing up, the whole formed one vast grey whirl, indescribably lonely and desolate. One of Peary's normal expedients was to ice the sledge runners, so that they might glide along more easily; every fresh fall of snow tended to nullify this, the sledge sticking so badly that both men had often to harness themselves to it before it would move.

They soon established a regular routine of work.

They always travelled by night and slept by day. At the end of a march Peary tied up the dogs, while Astrup built a snow shelter, within which the cooking could be done; each man acted as cook in turn. They soon found that they were hardy enough to dispense with the heavy sleeping-bags, which were then thrown away; the cook for the day had the snowhouse to sleep in, the other man protected himself with the sledge cover. Upon rising, one cooked the breakfast while the other tackled the irritating business of disentangling the frozen and frightfully twisted traces of the dogs. The animals then had to be caught—usually by springing on them, and getting bitten in the process—and harnessed; they again had to be disentangled before starting, and likewise several times throughout the day. This is an amusement at which all polar explorers who have used dogs have hurled anathema; but there is no escaping it.

For food each man had a daily allowance of $2\frac{1}{2}$ lb., principally pemmican (which is powdered meat, suet, sugar, and a few currants, and has about four times the nutritive quality of an equal weight of fresh meat), with some biscuit, condensed milk, pea soup, and tea. Occasionally a cup of coffee provided variety.

On this, his first long journey, Peary underwent every trial imaginable, but he never allowed his aim to be deflected. When the supporting party turned back the two explorers had one sledge each, but shortly afterwards rough ridges on the ice wrecked one of them. Its remains were then tied to the other, making a single sledge four feet wide, with three runners.

Land was constantly visible on their left hand, the surface gently ascending and descending at the heads of the fjords.

During one of the slight descents visibility became very bad, and after a time Peary concluded that they

242 Modern Exploration — Triumphs

were dropping too fast, and pulled up. Just at that moment a storm which had been chasing them burst, and they hurriedly camped. When it ceased two days later, and they emerged from their enforced confinement, they found, to their dismay, that they had got down on the upper part of a glacier, seamed by green clefts many hundreds of feet deep, and with the way blocked by jagged spikes of ice, the dreaded *séracs*. Out of this wilderness, with its many treacherous places, it took them two whole days to climb again. Once they came within an ace of disaster, for the sledge and all its contents shot over a crevice, and was prevented from falling to the bottom only by a projecting ledge of ice. Fortunately the goods were securely lashed on, and nothing was lost. Had the sledge vanished on this occasion both men would almost certainly have starved to death. On several occasions the dogs fell into crevices, but the traces always saved them; the men did not have this unpleasant experience of feeling only the air beneath them, but in subsequent journeys one or another was constantly tumbling in to the armpits. To add to Peary's worries dog madness broke out again during this part of the journey; several of the poor brutes had to be shot, their bodies being saved to feed the remainder. It is this horrible slaughter of the dogs which so nauseated Captain Scott that he was always glad when his sledges were man-hauled.

The route now turned more and more to the north-east, as it was forced away by a line of rocky headlands, which appeared to mark a strait or fjord on the north coast. After making much easting Peary struck out for the rocks; but both he and Astrup wore footgear suited only to the soft snow of the icy plateau, and their feet were much bruised and battered by the sharp angular boulders. A very painful trek brought them eventually

to the top of a huge cliff. Three thousand feet below them lay the Arctic Ocean, stretching away to the north-east, seemingly as a limitless plain. Before them was a large bay, a westerly extension of which bounded the line of heights that they had been marching beside, and this seemed as if it might extend, as a fjord, right through to Robeson Channel or Lincoln Sea. Beyond the fjord, on the north-west, was lower but very rugged land. Mist concealed it partially, and they believed that it represented outlying islands—a mistake that was not rectified till two years later, when Peary proved it to be part of Greenland. The day was 4th July (Independence Day, dear to the heart of Americans), naturally, therefore, the bay below them was named after it.

Peary knew that the limit of what could be achieved by Astrup and himself had been reached; however, there was no harm in a short trip down to the bay, and thither they went, not without much difficulty. That they did so proved exceedingly fortunate, for there, north of the 82nd parallel, they found innumerable tracks of musk-oxen; patches of grass occurred; the beautiful yellow Arctic poppy opened its petals above the barren stones; snow bunting and sandpipers gave a sense of home to the place; and two large black ravens lazily flew around, doubtless hoping to scavenge something from the travellers. The desire for fresh meat overcame all others. First, some hares were shot, and then the two men accidentally came upon a herd of musk-oxen, killing several of the great shaggy beasts, and reviving both their dogs and themselves with the meat.

Returning to the great cliff, they built a cairn there, in which was deposited a record of their journey; then they turned back for the long march to Red Cliff House. Apart from minor incidents, such as constant trouble

244 Modern Exploration — Triumphs

with the dogs, indisposition due to the great altitude, and imprisonment in a snow hut for sixty hours while a gale thundered on its walls, the journey was uneventful. Much of the time they were at an altitude of 7000 to 8000 feet above the sea, and were constantly enveloped in mist. The course being a straight line, any deviation from it, however slight, might land them far away from McCormick Bay, and the duty of steering, which was Peary's, became very onerous. Nevertheless, the direction proved approximately true; for now, as on all occasions, Peary displayed great ability with the compass, maintaining a correct course whatever the difficulties. He once located a dépôt to within a few yards, despite the fact that it was completely buried from view, and that there were no landmarks.

This first big journey, although its results were incomplete, gave him valuable experience, besides a confidence in himself that nothing could shake. How easily disaster might befall any of them, however, was shown on that very expedition, by the fate of young Verhoeff. Verhoeff had spent most of his time in attending to the instruments, in the tedious but important work of watching the tide-gauges and the thermometers. Shortly before the return of the northern party he went out for what would have seemed an every-day trip to an Eskimo encampment, from which he never returned. Peary made a long search for him, but eventually had to confess that he must have fallen into a crevice, and been killed.

A subsidiary but highly interesting piece of work was done by Peary and Cook jointly. They made a complete census of the Eskimos, every one of whom Peary knew personally; many of them were also photographed for anthropological purposes. Peary loved his "Arctic highlanders", as he called the cheerful little men, and he

did much to alleviate the hardships of their existence, by providing them with the means of hunting and of better living, without destroying the natural conditions under which they existed. This work was not only humanitarian; in the long run it paid. Of the six men who alone have ever marched to the North Pole four were Eskimos; Peary and Henson were the others.

No sooner had civilization claimed him again than Peary began to formulate fresh plans. The Navy Yard was his calling; but he felt that the Pole was his birth-right. Accordingly, he made another application for extended leave, being granted three years; and thus the 1893-5 expedition came into existence.

Few men have ever planned more carefully beforehand than Robert E. Peary. He knew exactly what he wanted to do, and he left nothing to chance at any time. His present object was twofold. An expedition of fourteen or fifteen men would establish itself once more in or near McCormick Bay, during the summer of 1893; depôts would be laid out on the ice; and in 1894 the majority of the explorers would follow the route of 1892 until it reached Independence Bay. It would then break up, one division going north, to examine the presumed low islands there, while another went east along the coast, until it linked up with Cape Bismarck, which at that time was the "farthest north" on the east Greenland shore. Providence, however, decided otherwise, for at the end of 1895, Peary, beaten, worn out, and reaping nothing but the barren glory of a triumph over adverse circumstances, was very little advanced beyond his limit of 1892.

He was not very fortunate in his men, some of whom failed to stand up to the rigorous conditions, and nearly all of whom took the first opportunity of going home during the second year. Only Astrup and Henson were veterans of 1892; the two most prominent newcomers

246 Modern Exploration — Triumphs

were S. J. Entrikin and Hugh J. Lee. Mrs. Peary also went again, being accompanied by her maid, Mrs. Cross.

The old, old problem of explorers, finance, gave much difficulty before the start. No Government funds were asked for, or offered, and Peary had to depend upon the receipts from lectures, and upon the profits of his wife's literary work, for the wherewithal to purchase and equip his ship. Even then they were heavily in debt, but the ship, the *Falcon*, was put on exhibition at various Atlantic ports, and the money taken in this way made up the deficiency.

Immediately he returned to Greenland Peary's first duty was to inquire after Verhoeff; but nothing had been seen of the missing man. Fresh winter quarters were established in Bowdoin Bay, not far from the old one; Eskimos were picked up, and transported thither; and the usual hive of activity sprang into being in that lonely place.

The *Falcon* being but a small vessel, she was employed to hunt walrus, while other work was afoot on shore, and the expedition was successful in slaughtering twenty-four of the huge animals, which yielded nearly 20 tons of meat.

On 29th August Astrup took a party up to the inland ice in order to establish the first depôt on the Independence Bay route; he had not been gone long, however, when he was forced to send back carrier pigeons—surely a novel means of communication in Arctic travel—asking for more dogs. Repeated efforts to carry out this depôt work were as repeatedly defeated by the weather; nothing was advanced more than 26 miles beyond the moraine, and one gale after another swept down upon the men, and drove them back to their comfortless tents. So fierce were the autumn storms this year that three sledges which had been left on the

moraine were blown away completely, and were never seen again.

On 12th September Peary had another anxiety. Mrs. Peary that day gave birth to a daughter. She was named Marie Anighito Peary, and she had the singular distinction of being, I suppose, the only white child ever to be born in such a latitude. Immediately afterwards the long winter night supervened; yet the child did not suffer by this deprivation of sunlight and was successfully reared. She proved an immense source of wonder to the Eskimos, whole families journeying many miles in the deep Arctic gloom merely to see her.

The house, which they called the Lodge, stood in a little bay not very far above the sea. One night during the autumn it was in great danger; a giant iceberg toppled over, and by its fall created a huge wave which roared into the bay, swept over the shore, and created chaos. The whaleboat, which had been by the water's edge, was hurled 100 yards up among the rocks, and stove in. What proved even more unfortunate, was that the water carried back in its recoil all the oil barrels, the dory, several bales of hay, and a number of puppies. Much of the oil was lost.

With a large party the winter passed easily. The ample supply of fresh meat kept at bay the bogey of scurvy. On 8th March, 1894, when Peary started out on his second long sledge expedition to Independence Bay, prospects looked bright; alas! it was but the cruellest deception. They had not been out five days before his two best men, Lee and Astrup, were incapacitated, the former with a frozen toe, and Astrup with internal trouble. On the sixth day a gale drove straight down upon them; floundering through the whirling snow, pulling, thrusting and lifting the sledges, which would not budge, they made only two miles; eight of the

248 Modern Exploration — Triumphs

weakest dogs had to be killed, and the two sick men broke down completely. Peary thereupon decided to send the rest on, while he and another (Clark) took back Lee and Astrup to the Lodge. He knew that two lightly-laden men could easily overtake the advance party, but he little reckoned on the trifling advance they made before he was with them again; one obstacle after another seemed to have taken much of the heart out of them, and, to put it bluntly, nothing much was done until the leader was there to do it. At this time even Peary was checkmated, however, for a three-days' gale pinned them all down to the tents, it being impossible to move. Meanwhile he had the consciousness all the time that no dépôts had been laid, and that every day lost meant a day less that could be spared for exploratory work at the northern end.

Immediately it was possible to get out of the tents they started once more, but the most violent exertions carried them only another 3 miles. When night fell, the disheartened little party crept into its two tents, not to repose, for the wind that made speech useless without was drifting the snow cheerlessly within. There were six men, three in each tent. One tent leaked badly, and two of its occupants became frostbitten; this forced Peary to collect the whole party in a tent meant for three, and it was so crowded that he and Entrikin stood between the pole and the door, all the rest of the floor space being taken up by the others. The canvas flapped madly; outside the wind howled its challenge, occasional blasts bringing a cry from the poor dogs; and inside the snow steadily accumulated, despite every effort to keep it out, until it formed such a mass that one man only could stand there. During this terrible night nothing kept them alive but their warm reindeer-skin clothes.

The storm lasted two days. A couple of dogs were

frozen to death, and many of the rest were fixed by limbs or hair to the snow, and had to be chopped free. According to the instruments, for 34 hours the wind had an average velocity of more than 48 miles an hour; while the temperature averaged minus 50° F., and at one time sank to minus 60° F., i.e. 92 degrees of frost. The thought of this, with a gale blowing, is something at which to shudder.

When at length it abated, everything was buried in snow, and the plan of the journey had been torn to shreds. From this camp the doctor and one other man returned. Four men only remained now, being combined into a single party, and even they were doomed to failure.

There were now left three sledges, each pulled by a team of eighteen dogs. Owing to the heavy snowdrifts and the constant head-wind it was possible only to make short marches; and to crown all, first one sledge and then a second came to grief upon the ice ridges, and a halt for repairs was necessary. The lashing and rearranging of loads in that temperature, and with the stinging drift always in their faces and their fingers "going" constantly, was by no means a cheerful task, but it had to be done.

One curious circumstance about this march was the mirage. Across the white, featureless desert giant men, sledges and dogs appeared, treading on air, and imitating all the actions of the real ones: probably those who were at that time suffering from the demon of cold wished themselves in the desert of Egypt, with the welcome glare of a hot sun, but they might as well have wished themselves in the moon! Entrikin, another of Peary's stalwarts, now unfortunately got frostbitten feet, but he would not stop. Two days later his dogs refused to pull against the wind, and in endeavouring to start the sledge he

250 Modern Exploration — Triumphs

strained his back. This reduced the number of fit men to three.

The next morning Clark's nose was found to be frozen fast to his sleeping-bag, and it had to be thawed off. Entrikin being too ill to march, a day was lost at this place, and that night the temperature dropped to between minus 55° F. and minus 57° F.

Still Peary would not admit defeat. While he had a dog or a single helper he was determined to go on. They started again, made a short march, and then the dogs broke down. He tried a 48-hours' rest, and apparently this expedient worked, for when they next essayed to get on much better progress was made. For three days they covered an average of about 15 miles, and then, to crown their misfortunes, the most furious gale of all arose, and they were stormbound for 72 hours.

This storm completed the destruction of the dog-team. Many of the animals were buried under the snow, two were dead, and several on the verge of death, before the explorers could get at them. The men themselves were in little better plight, worn out by continuous exposure, disheartened by the poor progress, and in no condition to continue. It was already 10th April, and they were still within 128 miles of the Lodge, but nearly 400 miles from the north coast, where their explorations had been designed to *begin*. Peary alone, resilient as a willow wand, was sound in heart and body, but he recognized that it was madness to continue. Reluctantly he gave the order to turn back, and the broken-down outfit crawled home to the Lodge, leaving behind a trail of goods that had perforce to be laid in depôts, of dead and dying dogs, and of broken sledge parts.

This concluded the principal work of the season, but it was still to be marked by one of Peary's most remarkable discoveries.

Many years earlier Sir John Ross had mentioned rumours of an iron mountain in Melville Bay, whence the Eskimos procured fragments of that useful metal, which they fashioned into tools: an extraordinary circumstance, for these primitive people had no other metals, and no knowledge of any. Led by an Eskimo, Peary and Lee discovered the place in the summer of 1894. It proved to be not a mountain at all, but a huge meteorite, weighing about 90 tons, and almost buried in snow; two smaller masses were also found, one of about half a ton, the other weighing 3 tons. The last remains of some shooting star, these fragments had fallen to the ice-covered ground hundreds, perhaps even thousands of years ago. These unbidden visitors from the ether would prove most interesting to scientists, if they could be transported to a civilized country; and efforts were subsequently made to reach them with the ship, but unsuccessfully. In consequence, the work was put off till a later season.

When the *Falcon* returned home that autumn she carried the two ladies and the baby, besides all the male members of the expedition except only Lee, Henson, and Peary. These three, standing silently on the shore, waved good-bye to the vessel which was their only link with civilization; then they went back to the Lodge and settled down to the tedium of the long winter. Peary now began to rely more upon his Eskimos, and in his winter and spring trips he engaged their interest sufficiently for many to volunteer to accompany him up to the Great Ice, which, till a year or two before, none of them would visit under any circumstances.

In the spring of 1895 Peary and his two loyal men made a fresh attempt to cross the terrible ice cap. Six Eskimos accompanied him at the start; he had sixty dogs and six sledges. The Lodge was locked up, and

252 Modern Exploration — Triumphs

those Eskimos who had found employment near it went back to their permanent camp.

All the equipment for this journey had been saved from the wreck of last year, and was makeshift and incomplete. The worst weakness was in the commissariat, for provisions were neither plentiful nor varied; almost from the start the little party had to be strictly rationed. However, Peary relied upon picking up the dépôts at which he had been forced to leave so much during the retreat. In this he was sadly disappointed.

They got successfully to the site of the first dépôt, but despite a long search not a sign of it was to be found. The weather being favourable, however, they pushed on, marching up to thirty miles a day, until they came to a place where 1400 lb. of pemmican had been buried; it was upon this that Peary chiefly relied for provisioning his sledges. To his dismay, it was buried under the white mask, and could not be found anywhere. He at once sent back his faithful Eskimos, while the tracks of the outward journey were still fresh. He says of them with justifiable pride, that they had followed him "where none of their tribe had ever been or dared to go before".

He explained the position to Lee and Henson. They had enough food to get to Independence Bay on reduced rations, but no more. It would be their first business on arrival to catch and kill musk-oxen for their further supplies; but as musk-oxen had been very plentiful two years earlier there was no reason to think that they would be scarce now. On the other hand, if anything went wrong the party would certainly be doomed. They were both brave men, and they took the risk; if it were good enough for their leader, it was good enough for them. So they marched forward over the ice, determined to conquer or perish.

There were forty-two dogs left. Peary went first with

one sledge, marking the route. Then came Henson with a sledge and trailer, and Lee brought up the rear with another sledge and trailer. When they had proceeded in this wise for three days Lee became indisposed, and the other two tied up the dogs and left them to their own devices while cutting up the meat and making camp. The dogs seized this opportunity to break away from the stakes to which they were secured, and swept across the camp, still tied by the traces; everything was upset and pandemonium reigned for some time, and it afterwards took five hours to straighten out the knots, in a temperature 25° below zero, with falling snow and a biting wind.

Of course the usual storms had to be battled against. One into which they ran was so furious that it flattened the tent on top of them, keeping them underneath the load of snow for two whole days, in acute discomfort. Two days seemed the average duration of the gales. A couple of dogs had to be killed at this place, to provide food for the remainder.

The elevation was now 7500 feet above the sea, an altitude at which any exertion beyond a certain limit speedily induces exhaustion; the dogs, moreover, were not pulling well, and one sledge had to be abandoned. Troubles now followed one another in quick succession. Immediately after passing the 400th mile, and just as they were commencing the downward slope to Independence Bay, the runner of the tent sledge broke. Then it became necessary to feed the remaining seventeen dogs on each other, in a desperate attempt to make the land; for they fondly hoped and believed that with hard rock once more beneath their feet game would speedily be found, and their troubles would be removed. Marching on reduced rations is not pleasant at any time; in the Arctic it is a bitter privation, for there the normal

254 Modern Exploration — Triumphs

ration far exceeds that which a man can eat in a moderate clime. Hunger and desperation spurred the three men on as nothing else could. At last a dark speck, far ahead to the left! Then another! The land! It was only just in time, for they were now reduced to semi-starvation, and were correspondingly weak, while of their dog team only eleven animals remained. In order to get down to the hunting-ground with the least delay, Lee, who was in the worst plight, was left at the top of the slope, 4800 feet above the sea; while Peary and Henson hastened down, with one light sledge and their rifles. The ground offered all the usual difficulties. Before leaving the snow they frequently fell into crevices, and though nobody dropped farther than to the armpits, the jolt and shock were not conducive to good spirits. After this danger had been passed they had to traverse the sharp, merciless rocks, on which they slithered and stumbled, every fall leaving bruises. When they reached the valley their anxious eyes failed to discern there any sign of life whatever. The musk-oxen had gone!

Peary did the wise thing. He stopped, and slept the sleep of exhaustion. When they awakened, refreshed but still suffering from the pangs of hunger, it was to find themselves surrounded by a grey, clinging mist. They left the sledge at a recognizable place, and then marched through the mist for hours, up and down over the stones, in search of food, but nowhere could any musk-oxen be discerned. Towards evening a snowstorm came on, and they returned to their sledge, after twenty-five miles' useless wandering, tired out, disheartened, and foodless. Beside the sledge they made what shelter they could, and as soon as the storm gave over they returned, still empty-handed, to Lee and the tent. This was probably the most critical moment of Peary's life.

All of them realized that their very existence depended

now upon their rifles; but what was there to shoot? The animals had all gone; the desolate land did not yield even grass! Next morning "three exhausted men and nine starved dogs" passed the 1892 cairn, with a snowstorm in furious pursuit; fortunately, they took shelter just in time, behind a massive moraine; but they were forced to remain there, when every moment was precious, for two days, before it became possible to move.

As soon as the weather cleared Peary and Henson set out once more on their errand of life or death; taking with them all the dogs, also rations for four days. They were faced by the fact that the food on the sledge would suffice for only a very short time, even on the half rations which had long been their daily lot. Now, however, fortune turned at last. First, they shot at a hare, and you may be sure that they did not miss it. Next day even better luck rewarded them. They beat up some ptarmigan, shot them, and—most important of all—found tracks of musk-ox. They were saved!

After hunting about for some time they came upon a herd of twenty-two of the shaggy brutes, to which they stealthily approached; taking every precaution, despite their excitement, not to let the herd escape. The oxen presently detected them, and pawing the ground, and with lowered heads, lined up facing the hunters. One savage bull took the lead, and when they had got within fifty yards, he made a motion as if to charge. At that instant Peary fired, and he rolled over dead. A moment later the whole mass of flesh would have been hurled with irresistible effect against the two men, who would probably have been trampled down and destroyed. As it was, the herd hesitated. Both men now fired as rapidly as they could; beast after beast fell, and the remainder bolted. It took until midnight to skin all the captures, and to feed the faithful, starving dogs.

256 Modern Exploration — Triumphs

Eventually they returned to Lee; the meat was packed up, and a few minor trips were made over the frightfully stony ground; then Peary, all his hopes dashed, turned the sledges homewards, not a moment too soon.

Had it not been for good weather on the return journey they would have perished. Lee was in difficulties, but he plugged along grimly, usually in the rear. The dogs, too, were mere shadows of those fierce beasts that had raced over the snow three months before; there were only seven remaining now, with two sledges to pull. When 400 miles had still to be covered one sledge was abandoned; meantime, the plucky Lee got steadily worse, and Peary was forced to halt two days to give him a rest, feeding him with peptonoids, milk, and brandy. By 10th June only six dogs were left; on the eleventh there were five, and the men had to drag the sledge themselves, the dogs following. At this point it struck Peary forcibly that he had practically the same distance to travel as was covered by Nansen, with a fit party, in forty days; and Peary had a sick man and nineteen days' half rations! But he cast these gloomy thoughts aside, and by sheer will and determination pulled through. Whatever happened, twenty miles a day must be covered; and, to his great credit be it said, twenty miles a day *were* covered. A week later only two dogs remained; on 21st June there was but one, and with it rested the last reserve of food for themselves. On the 23rd, to their intense relief, the eternal round of featureless white changed; there were dark patches ahead. These were twenty miles off, but they meant land—home! There now remained only four ship's biscuits among the three of them; to save the dog, it was fed on sealskin boots and the reins. At last they reached the moraine; never were men more thankful to feel the sharp stones beneath them! Lee came up as the others pushed on down to the Lodge, and just as

he staggered in at the door, the welcome smell of hot food assailed his nostrils. The great march was over.

Peary returned home that summer, to the duties of the Navy Yard; to lectures and to book-writing. Officialdom was now beginning to frown upon his frequent absences; but he had won the hearts of his countrymen—indeed, of everyone who understood the value of his work—and he went on persevering in the course he had mapped out. The summer of 1896 found him back again in Greenland, endeavouring to extract the huge meteorite. He failed, but the two smaller ones were removed. He then went again, in the summer of 1897, and this time removed the 90-ton giant to New York. On each of these trips supplies for his faithful Eskimos were not forgotten. Charitable motives apart, he foresaw a time when he would lean upon them for aid still more than he had done in the past. The Pole remained unconquered; and until it was conquered "Perseverance Peary" would not, could not rest.

The story of his ultimate success requires another chapter. In the meantime, let us transport ourselves for a while to a warmer part of the world.

CHAPTER V

In Indian Borderlands

Beyond the rain-soaked hills of Assam, with their tea plantations and their dense forests, lies a wild region of mountains intersected by deep swift-flowing streams, where the forest knife alone makes travel possible, and where the roads are mere footpaths or worse, running up the faces of cliffs and down the steepest clay slopes, with neither foothold nor handhold apart from the roots and branches of trees. This is the "Hills Country". By "hills" Indian geographers must be understood to mean mountains 6000 to 10,000 feet high, with sides at any angle up to the vertical, a definition of a hill which would hardly pass muster with the Automobile Association!

Far to the south are the temples of Mandalay, with their rich colours and their curious architecture; far to the west the dusty plains of India teem with a hundred million human ants; but here, in seclusion, fear and ignorance, dwell remote and savage tribes, many of the natives never having been farther in their lives than to the next village two or three miles away.

Numerous travellers have ventured on the fringe of these lonely wilds, while the colonizing genius of the British has pushed roads and forts little by little into the strategically important districts; but only a handful of men has ever crossed the ranges in their entirety, still more rarely has anyone ventured along the Himalayan watershed.

The headwaters of many rivers wander most intricately among the hills. Until fairly recent times it was by no means certain where even the principal streams began, for native opposition prevented any Europeans from ascending except by force, and force was strongly discouraged by the Indian Government. Native surveyors, using the same methods as we illustrated when we were looking at Tibet, had been employed to try to find the water-shed, but their maps were merely approximate, and their information, based on memory (and often on hearsay), was not dependable in the case of rivers that had a habit of turning back upon themselves, and flowing out again in the most unlikely places. Thus, for very many years three problems perplexed geographers about this region. Let us glance at the solution of one of them.

The problems concerned the three rivers, Salwin, Irrawady, and Brahmaputra.

The Irrawady is the Great River of Burma. To anyone who views its wide expanse at Mandalay it seems incredible that such a large stream should commence on the southern face of the Himalaya. The Brahmaputra, a broad, sprawling, and many-braided stream, splits into numerous large headwaters a short distance west of Sadiya. Two of these, the Dihang and Dibang, have an immediate interest for us, because one or the other of them was suspected to be the Upper Brahmaputra. The two most remote branches of the Irrawady—the Mali on the west, and the Nmai on the east, running parallel but with a 10,000-ft. ridge between—also ran back to an uncertain extent “into the hills”. Beyond the Nmai branch of the Irrawady is a high, narrow mountain chain, peopled by savage Lissu; and beyond that lies the continuous gorge of the Salwin. Another great ridge, another drop, and we come to the middle stretch of the Mekong. One more ridge, and we are in the gorge of the Yangtse-kiang.

260 Modern Exploration — Triumphs

Nowhere else in the world will you find four great rivers like this, all within a span of eighty miles, and all flowing in the same direction, only to debouch into the sea at points many hundred miles from each other.

North of the Himalaya explorers (using the methods which Littledale was forced to employ) gradually identified the sources of one big stream after another. Here was the Yangtse; there the Mekong. The Salwin was more doubtful, and although traced down to such a point that there is no reasonable doubt of its continuation in Burma, one stretch of it still remains untraversed. Of the Irrawady there was no trace. Far to the west, however, near the Karakoram Himalaya, rose a river, the Sanpo, which flowed east for at least 800 miles, past the valley up which Lhasa lies hidden, and towards a huge mountain knot, beyond which all was blank. According to some authors it crossed the mountains in great falls, emerging as the Upper Irrawady; according to others it formed the Upper Brahmaputra.

The probable solution of this problem was worked out by a succession of native explorers, who were sent in disguise from India. Many years ago the Pundit Nain Singh passed down the Sanpo to a spot thirty miles below the town of Tseting, but was then turned back; while in 1882 the Pundit A.K., at the close of four years' wanderings in Tibet, followed the watershed where the Irrawady ought to have been, but found no important stream there. Finally, another native, Kintup, was sent north specially to solve this problem by casting marked logs in the river above the unknown stretch; they were watched for on the Brahmaputra, but were not identified. Meanwhile, Kintup had pushed down the river to Pemakochung, where there is a fall thirty feet high and a lamasery; below this he found an impassable gorge, which he went round in a great bend to the Abor

country, on the Indian border. He was turned back by the Abors, was betrayed to the Tibetans, and was sold into slavery. Eventually he escaped, with nothing to show of his travels but what his memory retained.

From the facts related by Kinthup it was reasonably certain that the Sanpo and Brahmaputra were one, the connecting link being the upper Dihang; it was also clear that the river must fall 6000 feet in less than 100 miles, but whether any gigantic falls intervened was unknown. As the Dihang, almost from its mouth upwards, was long represented by a dotted line, owing to the hostility of the hill tribes (the Abors), Kinthup's solution of the problem remained unproven until three or four years before the Great War.

A very capable and popular frontier officer, Mr. Williamson, had for some years been cultivating the friendship of the wild tribes north of Sadiya. In the spring of 1911 he was invited by one of the Abor headmen to enter their country, and while there he was murdered. The result was the usual punitive expedition, but on this occasion it had important geographical consequences.

The Abor country is a more heart-breaking place even than Greenland. It affords nothing but one hill after another. The roads are mere tracks, either spun out treacherously along the edge of the cliff, or passing up an absurdly steep hillside, to a crest across which one can almost sit astride, and with an equally steep drop on the other side. Although worn to some extent by the feet of the natives, it is covered with roots and creepers, which afford invaluable foothold and even handhold; in the steepest places ladders are necessitated. In the bottoms of the hot valleys the track is more open, for there the savages cultivate small patches; everywhere else is the densest forest.

262 Modern Exploration — Triumphs

The whole country being seamed by water-courses, some means must be found of crossing the rivers; this is provided by cane bridges of peculiar construction. Some of them are quite masterpieces of engineering. They have three stout cables made of rattan canes, firmly attached to trees on both banks, and curving down at a very steep angle till they meet in the middle. Cross ties keep them in place, and the floor is made of a subsidiary ropework. Of course the canes give at every step, and the whole structure sways from side to side; nevertheless several people can cross at a time, and despite its appearance the bridge is perfectly safe. Far otherwise is the bridge which less skilful tribes build, and which may consist of one or at best two cables working on the gravity plan, i.e. with the point of arrival on the far bank much lower than that of departure. On these the traveller sits in a most precarious cage, with his back to the roaring river underneath, and, trusting to luck and his own skill, impels himself along backwards by pushing with his feet, with every likelihood that the greased runner attaching his support to the cable will stick fast at the most awkward moment.

The Abor punitive expedition made some small impression upon this country. It took place in 1912. Mule roads were built, and surveyers followed the river up to the Tibetan frontier, almost reaching a place called Kapu, 2610 feet above the sea, and close to a well-known lamasery. For several reasons it was unable to proceed farther. At this point Captain (now Colonel) F. M. Bailey comes on the scene.

Bailey was already well seasoned in Tibetan and frontier travel. He had been working during the previous year with a military mission among the Mishmis, a tribe occupying the upper Dibang, and even wilder and more isolated than the Abors, whose territory they adjoined

on the east. Prior to that he had made a notable journey across Central Asia, and he was one of Younghusband's men in the Lhasa expedition. He had the admirable quality of easily establishing good terms with the Tibetans. In the adventure of tracing out the Dihang above Kapu he was accompanied by a man whose tastes differed very little from his own: Captain Morshead, of the Indian Survey, a man of remarkable energy and courage. It was Morshead who did the preliminary mapping in 1921 which made the attack on Mount Everest possible, while he subsequently participated in that great adventure, being forced to retreat when severely frostbitten.

They had native coolies, inadequate supplies, abundant confidence in themselves, and some surveying instruments; and with this outfit they left Mipi, a village on the upper Dibang, on 16th May, 1913, to cross over two mighty passes down into the adjacent valley of the Dihang. It was the worst season of the year, and the monsoon had broken; consequently it rained every day, and the frightfully poor track, the deliberate marching of the coolies, the insatiable rapacity of the leeches (which are like black threads, and have a habit of dropping down one's neck off trees, and then gorging themselves on one's blood), the occasional swarms of mosquitoes and sand-flies, contributed to make a day's march anything but happy. On each of the two big passes the snow was thigh deep, and as it was raining hard, the ascent and descent had to be made through much of this treacherous slush, while snow avalanches lent a spice of extra danger to the work. Finally, however, they got down to Kapu; duly visited the Lamasery; sent a letter to the Abor Survey Party, in order that their own identity might be placed beyond suspicion, and then proceeded, during much of June, northwards up the hitherto untrodden part of the Dihang or Sanpo, as we will now call it. It

264 Modern Exploration — Triumphs

was terrible work, for all the spurs of the mountain on which they stood, and through which the river roared in one tremendous gorge, without any falls, out of sight as a rule, but clearly to be heard, were separated by equally deep minor gorges; so that to travel one mile forward meant going 3000 feet up in the clouds, and down 3000 feet on the other side. One of these spurs was a mile high, with a slope of 45° . Nevertheless, they arrived at last at Lagung, a village in line with the east-west course of the Sanpo, and at the very apex of its bend. Here they wished to turn west, but a local official with whom they became friendly diverted them northwards, and they afterwards had to make a roundabout tour, coming on the Sanpo again above Pemakochung, i.e. in the stretch which Kintup had described. Throughout this time, of course, Morshead steadily went on with his surveying; altitudes of streams were taken by boiling-point thermometer, and panoramas of the country were obtained whenever the vegetation was sufficiently open to enable anything to be seen. Down in the Sanpo valley, however, it was dry and relatively warm, though cold by comparison with the plains of India.

They pushed down the valley for some way, but it rapidly became forested, and eventually there was no track, other than one used by wild animals; the river, too, ran faster and faster, until it was galloping in rapids between two gigantic peaks. That on the south, Namcha Barwa, 25,455 feet, had been known before; but that on the north bank, Gyala Peri, was a beautiful and hitherto unknown snow peak, 23,460 feet high. It was found impossible to get sufficient coolies and food together to continue; so the party broke up, Morshead continuing surveying towards the places they had passed, while Bailey, with one follower, tried to cut a way through the forest. Giant rhododendrons barred the way; higher up



E 568

COMMENCEMENT OF RAPIDS ON THE SANPO OR
UPPER BRAHMAPUTRA

By permission of Lt.-Col. F. M. Bailey (who took the photograph) and The Royal
Geographical Society, London

rose the serried rows of pines. Bears and other wild animals inhabited this forest, through which they had made a regular track, but it was exceedingly difficult for men. Fortunately, Bailey fell in with a party of natives who lived downstream, and who had been collecting honey. He went some way with them; but eventually they dodged off, camping beyond a cliff down which he had no way of getting. His food having given out, he was forced to return; and after many other wanderings in this quarter of Tibet, the two surveyors eventually found their way back to India through Bhutan. The spot reached by Bailey was about fifty miles from Lagung; the course of the river in the intervening span was not open to much doubt, and it does not appear to contain any falls, but it still has to be traversed.

The middle stretch of the Salwin, which runs in a deep gorge with forbidding hills on either side, is a happy hunting-ground for murder and robbery, and although nominally subject to China it is in reality very independent. This is the home of the Lissu, tall, well-built savages, living in village communities, and divided significantly enough into the categories of Tame Lissu and Wild Lissu. The former are scattered along the left (east) bank of the river, and are largely dominated by Chinese influence; the latter have always displayed an uncompromising hostility to any efforts to penetrate their territory. They are armed with cumbersome swords and heavy crossbows, the arrows being tipped with aconite (a deadly poison), which grows wild by the roadside. The villages are surrounded by small cultivated plots, and the Lissu, who live in bamboo houses raised above the damp ground, keep sheep, goats, cows, and pigs.

One incident will show you what manner of men are the wild Lissu.

266 Modern Exploration — Triumphs

In December, 1908, Dr. Brunhuber and Mr. Schmitz, two German travellers, started from Tengyueh, in Yunnan, to travel west to the Salwin, which they proposed to ascend. They succeeded in penetrating up the river for some distance, when they came to a village called O-ma-ti; here, as usual, the lack of carriers held them up, and they drove a bargain with the local headman, who undertook the service, along with eleven of his tribe. The Lissu, however, had no intention of serving, for after going a short distance they dumped their loads on a sandbank, leaving the two travellers and their one Indian servant to their own devices. The Indian was sent back to the village to buy a fowl, and he noticed signs that hostility was intended, but the unsuspecting travellers pooh-poohed this idea, and spent the night on the sandbank, hoping that the carriers would return on the morrow. Sure enough, the Lissu did appear next day; they were all armed with swords and spears, however, and this fact should have taught Brunhuber how to deal with them. He made the fatal mistake of allowing them to come near and to argue; each of the two travellers was surrounded; suddenly one man stabbed Schmitz with a spear, and in an instant both these unfortunate men were hacked to pieces. The Indian was captured, the goods looted, and the bodies of the travellers thrown into the stream. Subsequently, the Indian made good his escape, and a punitive expedition from China captured most of the brigands.

As to the upper Irrawady, the main branch of which is known as the Nmai River, much of this was first traversed by a European in the winter of 1911-12, when Captain B. E. A. Pritchard made a very remarkable journey from Myitkyina to Sadiya, passing near the head-waters of the river. Pritchard was a linguist who had spent years in acquiring a knowledge of the native

dialects. He had little difficulty with the people, in consequence, but this was more than counterbalanced by the vile travelling conditions of the country.

Most of the route, though peopled every few miles by clusters of native huts, with their patches of fields, surrounded and looked down upon by the eternal forest, was entirely unknown; being represented on maps by a dotted line where the river was supposed to run. Accordingly, Pritchard took with him a native surveyor, so that mapping and pioneer journey might go hand in hand.

Myitkyina is a town above Bhamo, on the upper Irrawady; and the first few days' journey being still within the pale of civilization, passed uneventfully. They reached Hkrangkao, a village where Pritchard established a depôt, and had nothing more difficult to contend with than the inevitable up and down grades as they passed spurs leading to the river. As they proceeded, however, the spurs closed in, and the familiar aspect of northern Burma—up one roof side and down another, the characteristic "road"—supervened. At Hkrangkao he decided to make a side trip to the Chengkaw Mountains, which frowned down upon him on the right, and formed the Salwin water-shed. No sooner had this excursion commenced than the porters deserted, and Pritchard and his surveyor, struggling to the tops of 10,000 feet "hills", found that they could see nothing, because of the incessant rain and mist. The traveller here developed ulcerated chilblains, and after much suffering was forced to return to Hkrangkao, with the survey unfinished. His feet now became so bad that it was impossible to wear boots, but being of buoyant and determined spirit, he decided to go on, although for a month he had to walk barefooted over the rough native paths.

The track now hugged the river, which, usually invis-

268 Modern Exploration — Triumphs

ible, ran like a millrace on their left hand. Only now and then they saw it far below, between the masses of trees and the extraordinary hills. Like all north Burma tracks, the route was overgrown and obstructed by fallen trees and bamboos, with dark gloomy tunnels between the overhanging rhododendrons and firs. The upper parts were so slippery that even the natives had to employ pointed bamboos, which they thrust into the muddy cliffs so as to get some sort of foothold. It rained morning, noon, and night, and the mist proved a constant hindrance to surveying, for from the hilltops, so often and so laboriously ascended, nothing could be seen but fog. The camp fires often went out. The leeches were plentiful and hungry. Under these conditions the three or four miles per day which they achieved was satisfactory progress.

Throughout this part of the journey food was very scarce; the carriers, also, were reluctant to go farther than from one village to the next, which meant a constant succession of new men. However, they carried the loads cheaply enough "for six annas a day, or for a few brass buttons, blue beads, or other baubles". At one place hereabouts the party descended 3000 feet in $1\frac{1}{4}$ miles. Pritchard describes the people as "cunning, avaricious, untrustworthy, and excitable". They were hospitable, however, and good to their dogs. In one case he saw a Maru tribesman carry a dog across a stream, in order that it should not get wet. On the other hand, dogs form part of the menu when food is scarce. Nearly everyone smokes a pipe. The houses are built on piles, two to four feet above the ground.

They proceeded slowly, mostly in thunderstorms and rain, with occasional fine spells, during which the forest tops looked grand, with a background of high mountains. When the thunder burst, the peals rolled up the valleys

like the sound of gunfire, the flashes of lightning lending the appearance of the discharge of artillery. At one place beyond Chelapta they were six hours in going four miles; the first two miles along bamboo poles fixed into the face of a cliff, the last two through dense jungle grass, through which they burrowed like ants. On one stretch of this "road" Pritchard fell fifteen times in half a mile and "plunged literally headlong down the hillside". At another place they had to plant bamboos in front, and then to haul themselves up by their aid.

From the upper Nmai Pritchard turned westwards into Hkamti, a semi-civilized plain, where the British had an Agent, and where he had a temporary relief before tackling a patch of equally bad going on the Sadiya road. It was here that, a dozen years earlier, Prince Henry of Orleans nearly came to grief through the starvation of his party. Rain poured down incessantly, and leeches were very bad. At one place he found fifteen of them in one boot, which was full of blood. Nevertheless, after all his trials were over, and he reached the railhead at Sadiya, Pritchard regretted having to leave the wild hills, the strange people and the nomad life of upper Burma. Unhappily, their fascination led to his death, for during the succeeding year (1913) he was drowned in the Taron River.

CHAPTER VI

Adventures of the Duke of the Abruzzi

Of all the natural phenomena which make a lasting impression on the mind, mountains rank easily first. Particularly is this true in primitive or unsophisticated communities, to whom the mountains are the abode of the gods. They speak to such people with the demon voice of thunder, and the lightning is their divine anger. In their deepest recesses and up among the fearful precipices, where nothing but a bird can hang, dwell the spirits of good and evil. The avalanches, daily thundering down from snowfields that no foot can reach, are but a warning to the inquisitive to keep away. Even the tourist experiences such emotions when first he beholds the grim rocky face of the Matterhorn from Zermatt, or the mass of Monte Rosa from the south.

To the trained mountaineer—he who is skilled in the use of rope and ice-axe, to whom the proximity of a vertical drop of thousands of feet means nothing, and who regards as “easy” a slope as steep as a house side, provided it gives him hand- and foot-hold—mountains present another aspect. Their serene beauty—the clouds that float around their summits, the glorious sunrises, the pictures they present of Nature in her most savage and yet most imposing guise—tempts him as the magnet tempts the needle. To tread upon their highest snows, to assail them by the most difficult ways, and to conquer the most dangerous obstacles, are to him the cream of

life. And of all the many skilled mountaineers who have risked life and limb in battles with the mountains, none has dared more, or been more successful, than that brave Italian Prince, H.R.H. Luigi Amadeo, Duke of the Abruzzi.

From his youth onwards a passion for climbing, combined with all the resources attached to his station, and a great natural organizing ability, led this real Duke (for Duke or *Duce* means leader) to attempt feats that had hitherto defied the stoutest-hearted mountaineers, and by a happy combination of skill and good fortune, he succeeded in three very notable enterprises—the first ascent of Mount St. Elias, the first complete penetration of the Mountains of the Moon, and the attainment, in the Karakoram Himalaya, of the highest altitude ever reached; the last being a record that still stands, apart from the Everest expeditions. Singularly enough, all these performances were on mountains which lie on the borders of the British Empire. By way of a diversion the Duke took an Arctic expedition north in 1900, when one of his sledge parties secured the coveted “farthest north”; and this endured until Peary wiped the slate clean in his journeys of 1906 and 1909.

Moreover, the Duke showed himself to be no mere record-hunter. Trained surveyors and meteorologists accompanied him on every trip, and he had besides the services of perhaps the finest landscape photographer in the world, Vittorio Sella. Thus all the Abruzzi expeditions materially increased geographical knowledge.

Nurtured within easy distance of the Alps, the Duke's thoughts naturally roamed farther afield. At first he contemplated an attack on Kanchenjunga, the second highest peak in the world, but political considerations compelled the relinquishment of this idea. He then bethought him of Mount St. Elias, a giant peak on the

272 Modern Exploration — Triumphs

border of Alaska and Yukon, and the summer of 1897 found him threading a way among the maze of mountains and glaciers to the base of this mountain. On the way he encountered an American expedition, under H. G. Bryant, which was returning home after having failed in the ascent.

In many respects Mount St. Elias is the noblest mountain on the earth. It overlooks the Pacific Ocean, from which it is less than forty miles distant, and it is so much higher than the surrounding country that it can be seen from a steamer 150 miles away.

A fairly symmetrical mass, its summit rises into a huge blunted triangle, 18,000 feet above the sea; on either side a great buttress rests, but several thousand feet lower, as if conscious of inferiority; there is then a downward slope for some distance. The whole of the Pacific face is gashed by gigantic precipices, with a total vertical fall of three *miles*; they are largely bare rock, but from their upper parts avalanches continually fall, looking at a distance like clouds playing about the face of the peak. One of the biggest glaciers outside the Arctic, the Malaspina, spreads like a vast white tablecloth across the thirty miles to the sea, rising at its upper end into ordinary glaciers of steep slope, which have their heads in the peaks. Except for Indian encampments some distance away the neighbourhood is uninhabited.

Attempts to explore the vicinity of the peak, and to ascend it, had been made by several people before, especially by Seton Karr, Topham, and I. C. Russell, of the United States Geological Survey. Mr. Russell, in particular, made a very complete reconnaissance, and his adventures of 1891 will show you very clearly what conditions the Duke had to meet six years later.

The only convenient way to get to the peak, other than a most roundabout and difficult route through the

interior, is by water. There is no proper landing-place; but in Icy Bay, where the Yahtse River carries the drainage from the Malaspina Glacier, rowing boats can reach the shore in favourable weather. At all times long Pacific rollers break in heavy surf, and it is necessary for the boats to ride on the waves, and seizing the favourable moment, to row in hard, and be hauled up before they are overturned. The goods are flung out pell-mell on the beach, and as many of them as can be saved from the recoiling waves are afterwards carried up to safety.

Mr. Russell took a small but competent party, being landed by sailors from a United States gunboat. At the first attempt two boats were overturned, and four men and an officer were drowned. I mention this disaster just to show you that landing in Icy Bay has its perils.

Once ashore, and while their effects were being dried, the party looked round. They found themselves in an open forest, clumps of spruce and alder trees alternating with meadows in which were buttercups and other northern plants, besides masses of wild strawberries; there were also numerous tracks of bears, which feed on the fruit. Passing inland, the expedition had to cross the many branches of the Yahtse, which, like all glacial streams, was swift, treacherous, and constantly changing its course. To wade over the shallower places involved the risk of being pulled down by quicksands; on the other hand, to fling a tree across was only a temporary expedient, for the river would speedily undermine the bank and carry the bridge away.

The expedition lived in tents. Every night the blue smoke of its camp fire curled up to heaven, and every night the wolves could be heard howling from afar while the embers glowed, and the tired men sank into repose. The greater part of their supplies had, of course, to be carried with them, but they were fortunate enough

274 Modern Exploration — Triumphs

to shoot a bear, which furnished them with fresh meat.

They first moved inland a mile or two, when they were confronted by a steep slope, little less than a cliff, and 300 feet high. It was covered with earth, boulders, and angular fragments of stone. At a thousand points springs jumped out. Ferns grew in boggy places; while spruce trees, with a mixture of alder, leaned at every angle down to the horizontal; for landslides had been frequent. All the vegetation was matted together by berry-bearing shrubs, and by the terrible spiny "devil's club".

This leafy place was actually the front of the great flat Malaspina Glacier. All the rocks which that ice had brought forward to its snout during many centuries had collected here into a moraine; and on to the moraine seeds had blown, and the damp, warm Pacific winds, aided by the long growing season, had done the rest. By digging a little way into the mud or stones, it was possible to see the ice beneath.

They cut a way to the top of this curious cliff, to find themselves in a dense forest. Like the other, it was actually growing on ice, and it was so matted and impenetrable that they were a whole day in cutting through its width of four miles. Tracks showed that it was haunted by game of several kinds; bears and wolves were undoubtedly the most common.

Once through the forest, they came to a dismal wilderness of rocks and mud, slippery in the extreme, and looking for all the world like a succession of huge rubbish heaps side by side, except that none of it was human rubbish. Slithering and stumbling over this they came at length to clean white ice, and there stretched before them, as far as the eye could reach, the vast plain of the Malaspina Glacier, its surface moulded into low mounds and dotted by many strange little circular green

lakelets. In order to cross this featureless expanse Russell laid down flags to point the way.

Beyond the Malaspina Glacier they came to a rather rough little belt of hills which, starting in the southern face of the mountain, thrust their end out among the ice. On the east of them, an ordinary glacier ran up to the avalanche region; beyond that was a similar line of low hills, and beyond that, in the cracked and jagged surface of a second glacier, lay a way round to the back of St. Elias—the only way to the top.

Russell attempted this twice, but bad weather beat him off after he had reached 14,000 feet above the sea.

The Duke of the Abruzzi, of course, knew all these facts which his predecessors had had to find out one by one; nevertheless it took him more than a month to get up to the glacier at the foot of the peak. On 30th July, 1897, he started on the ascent proper, reaching about the same level as Russell had done, and next day, without any fuss, his flag rested on the summit. So much for Mount St. Elias!

His next venture was in search of the laurels that had been so hardly won by Nansen and Johansen, only four years before (1895). Drifting, Viking-wise, across the Arctic Ocean, Nansen had left his ship, the *Fram*, and with one companion had made the most extraordinary sledge journey on record, during which he attained the then "farthest north" of 86° 14'. He returned, after many hardships, to Franz Josef Land, a northerly group of uninhabited islands.

This exploit had fastened the popular imagination upon the Pole, and among others the Duke was fired to emulate Nansen's great example. He carefully planned a strong programme, and in June, 1899, his yacht, the *Stella Polare*, reached Franz Josef Land. The season

276 Modern Exploration — Triumphs

proved remarkably open, for the ship was enabled to steam past Nansen's winter quarters, and even past the northernmost of the islands, into the open ocean. This finally proved that there was no land route to the Pole on that side.

Returning to Teplitz Bay, Crown Prince Rudolf Land, winter quarters were established; an observatory was set up, and preparations went ahead for a journey northwards in the spring. During the preliminary sledging the Duke's hands were badly frostbitten, so that when the real adventure started he was perforce left behind.

The Polar party was led by Captain Cagni. He set out on 11th March, 1900, with twelve companions. The plan was that at given points three men should return, until only three remained with the leader. They had at first much trouble with the hummocks and lanes, but conditions improved later. They passed Nansen's farthest north, reaching $86^{\circ} 33'$. This great effort, however, was made possible only by cutting down the rations to a minimum, and although the ice continued favourable Cagni was forced to turn back. They had to slaughter the dogs to keep themselves alive, but after 104 days over the ocean the little party reached its winter quarters. Unhappily, one of the supporting parties of three was entirely lost, probably having been caught in a lane of open water and drowned, in the same way as one of Peary's best men perished nine years later.

The Duke's good fortune holding, the *Stella Polare* made a fairly easy escape from the ice. His dash for the Pole had not succeeded, but having regard to all the circumstances, and particularly his inexperience of Arctic travelling conditions, it was a highly remarkable and successful adventure.

Six years elapsed, and by the end of that time he had been drawn to that magnetic continent whence so many

travellers have never returned—Central Africa. We will follow his wanderings there in some detail.

In the heart of the continent, some distance north-west of Victoria Nyanza, lies a group of peaks, not the highest African mountains, but easily the most picturesque and mysterious: Ruwenzori, or the Rainmaker. Well do they deserve their title, for they are almost perpetually hidden by mist, which wraps itself around the peaks and renders them invisible, even though they have a visual height of more than two miles.

The demons of storm, famine, and fog long conspired to keep Ruwenzori's peaks unknown, even to the acute travellers who frequently passed beneath their shadows. They were first detected by Stanley, who, after his long and bloodstained crossing of Africa in search of Emin Pasha, ran down the mountains almost by accident. He knew, of course, that ancient geographers and native legends alike mentioned mysterious Mountains of the Moon, whose snow-fed torrents gave to the great Nile its source, but nobody had ever seen them, and when, in 1889, Stanley emerged from the dense Congo forests, and saw ahead of him the dark outline of massive peaks, with snow on the skyline, he at once dispatched Lieut. W. E. Stairs to explore farther.

Ruwenzori comprises about a dozen summits in a compact oval mass, mostly collected in groups of two or three, with high passes or *saddles* between the members of each group, and profound valleys separating the groups. Beyond the western edge of the oval runs the deep valley of the Semliki River, joining Albert and Albert Edward Nyanzas; on the other boundaries various streams drain away to the African plateau, especially towards the south and south-east.

Thus Stanley, who was advancing from the west, came upon the steepest side of the mountains; and

278 Modern Exploration — Triumphs

besides engaging in a miniature warfare with the natives, he had to contend with the mist and haze which incessantly hid Ruwenzori from view. His lieutenant, Stairs, forced a way through the long grass of the plains and the scrubby growth of the lower slopes, when he was met by natives, who rushed about, trying to drive him back by blowing horns and yelling. He pushed on past them, however, to a forest of bamboo, through which a way had to be forced or cut. All the while ascending, he came eventually to a region of weird tree heaths and fields wet with moss. He now saw snowy peaks ahead, from which he was separated by three deep ravines full of vegetation; but now his provisions gave out, and he was forced to retreat.

Two years later the German traveller Stuhlmann ascended on the same side to 13,326 feet, but had to turn back before gaining any of the summits. A similar altitude was attained by Scott Elliott in 1893, when he made five excursions into the mountains. In 1900, J. E. S. Moore was the first to reach the snows, by gaining 14,900 feet on Mount Baker, and in the same year Sir Harry Johnston also passed the snowline on the same mountain. It should be explained that the ascent of Mount Baker is achieved by ascending the gorge of the Mobuku River from the S.E. At a remoter point this stream runs into the Bujuku, whose upper course is the true way into the mountain knot; but at that time ~~this~~ fact was not known, and the Bujuku was accordingly ignored. In 1905, D. W. Freshfield, a famous alpinist, reached 14,500 feet, also on Mount Baker, but was then driven back by fog and storm. Grauer also attained the ridge of Mount Baker; as did A. F. R. Wollaston¹ a few weeks before the arrival of

¹Dr. Wollaston was cruelly murdered at Cambridge University, 3rd June, 1930.

the Italians. Most of these travellers, of course, were aware that other peaks than Mount Baker existed, from stray glimpses through the driving fog, but none of them knew very much about those peaks, or even which was which.

This was the position when the Duke of the Abruzzi set foot in Africa.

The collection of the multitudinous requirements for a large party, and their transport to the heart of the continent, required much forethought and good judgment, even though a railway ran part of the way—i.e. to Nairobi. By 14th May, 1906, however, the expedition was assembled complete at Entebbe, with 247 negro (Baganda) porters, 26 Indian soldiers, and others, making a total of 400 souls in all.

The journey of 180 miles to Fort Portal, which is on the road to the peaks that Freshfield and the rest had climbed, took 15 days, during which the long caravan slowly wound its way across the dusty plains, camping each night within a stout thorn fence.

Fort Portal is a British outpost 5000 feet above the sea. Upon leaving it on 1st June, the Duke was uncertain where to go, not knowing which were the highest peaks, or where they lay. He followed the Mobuku valley, i.e. the route of his predecessors, though not without misgivings. It being the dry season the transport of the supplies to the outskirts of Ruwenzori proved easy, except at the River Wimi, which had to be crossed by a rope ferry, so that the laden porters should not be carried away by the current. From this point two peaks were visible, and the Duke's geographical instinct, always remarkable, told him that he was not taking the right road; nevertheless, he gave way to his advisers, and went on.

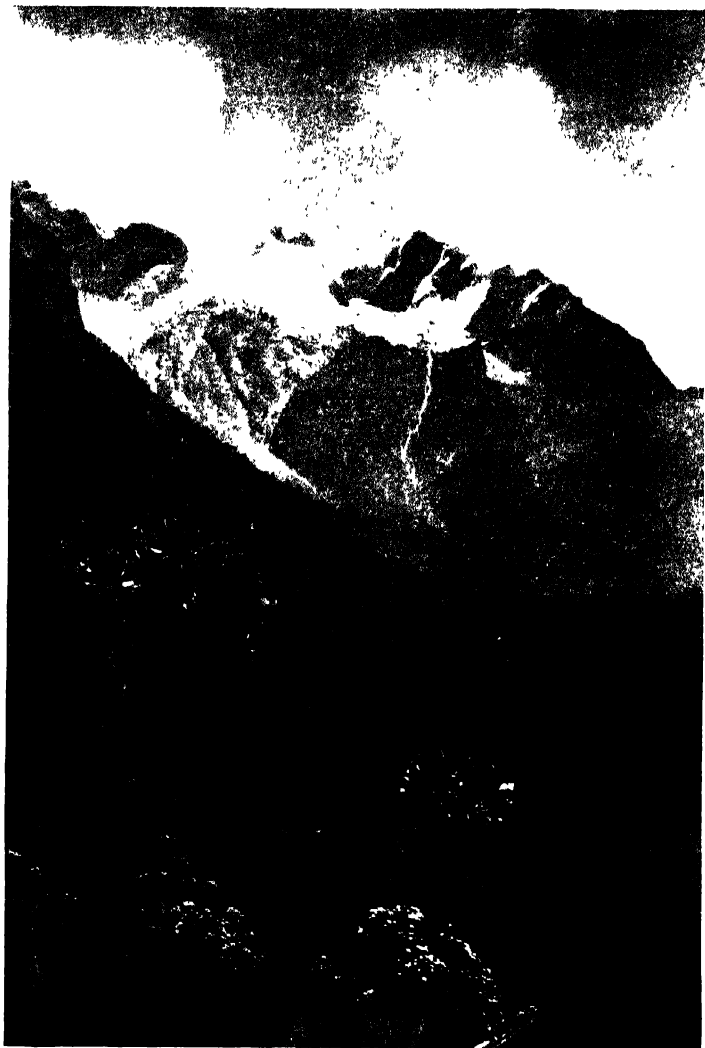
On 4th June, they reached Ibanda, a village on the

280 Modern Exploration — Triumphs

Mobuku, thence clambering by a native path over a very steep hill to Bihunga, 1791 feet higher than the last-named, and 6320 feet above the sea: this was the site of the highest native dwellings, the people being naked, jovial, and peaceably inclined. Wollaston's party, which was still in Africa, had spent several months at this place, so that the engagement of additional porters became an easy matter. It proved difficult, however, to pitch the tents, owing to the scanty amount of level ground.

From Bihunga the track led over another steep hill, the slopes of which were hidden by massed firs, tree ferns, laurels, and other trees; behind it rose other cliffs, all crowded with plants wherever these could get a hold. They were now high above the Mobuku, at this point only a torrent, and they followed the crest of the ridge until they came to an uninhabited rest-place, Nakitawa (8602. feet). Here they camped under a huge erratic boulder, the relic of a day, thousands of years since, when glaciers had crept thus far down the mountain side; opposite stood the majestic Portal Peaks, guarding one approach to the Mountains of the Moon. As all paths ceased from this point onwards, more than half the porters had now to be left behind.

The march, which was resumed in fog and rain, commenced with a very slippery descent into the valley of a tributary stream. Rising again, they came to a belt of bamboos, the southern equivalent of what Stairs had observed on the west of the mountains. A way had to be cut through this, while the porters dumped their loads and jabbered, and the rain poured down; it proved no light task, for fallen bamboos lay across and between those still standing, and had created an inextricable tangle. A common noise in the bamboo zone was the chattering of inquisitive monkeys; hereabouts, also, the chimpanzee had its haunts.



QUEEN MARGHERITA AND QUEEN ALEXANDRA PEAKS

From a photograph by Vittorio Sella, who accompanied the expedition led by
H.R.H. The Duke of the Abruzzi

Once past this jungle the column found itself in a worse plight still; a large swamp had to be crossed, where they wallowed knee-deep in squelching moss, mud, and water. Crossing the Mobuku once more, and still pushing up through slime and filth, they reached another rest point, Kichuchu. They were drenched by the unceasing rain, scratched and cut by bushes and treacherous sword grass, and covered from head to foot in mud. Nevertheless, the swamps around Ruwenzori have a beautiful aspect. They conceal many curious plants, and are the home of several remarkable kinds of sun-birds; at that moment, however, the Duke had very little use for anything but the Sun himself. Despite their hard work, they were still only 1131 feet higher than the last halting-place; while the camp site proved even worse. It was an enormous overhanging cliff; rain beat in on the so-called shelter, and water dripped down on it from above. At Kichuchu many more porters stopped, and some of the loads had to be abandoned.

They next gained a thousand feet of height by following a natural gully that fortunately seamed the cliffs; at the top was another extraordinary level plain, the rise to this point having been by gigantic steps. The floor of the plain was carpeted by a luxuriant growth of most objectionable moss, sopping with water, and concealing beneath its leaves crumbling pieces of rotten timber, holes full of water, and sharp-edged stones; every step upon it meant the risk of a broken ankle. In all directions giant heaths stood above the green; they were veritable trees thirty and sometimes even forty feet high, some vertical, others weakened at the roots, others bending over like old men, and looking, beneath the green stringers of moss, for all the world as if its fingers had been stretched up to pull them to the ground, and

282 Modern Exploration — Triumphs

to drag them rotting to destruction in its cold embrace. When the sun made one of his infrequent appearances the water on this mossy wilderness sparkled like myriads of tiny diamonds; but on a dull day, with rain beating in one's face, one's boots wet through, and everything damp, mildewed and unpleasant to touch, it was miserable indeed. Besides the tree heaths, giant groundsel and immense lobelias rose fantastically in the gloomy light; here and there were patches of big white everlasting flowers. The whole place had a silent, mysterious aspect, and was practically devoid of large animal life.

The native porters, although carrying loads of 40 lb. each on their heads, jumped with agility from trunk to trunk, while their white masters floundered in the morasses, or crunched down the trembling and rotten wood. Recrossing the stream once more, they were pulled up at the base of another great cliff, 650 feet high, and on climbing they were faced by yet another plain, with more of the moss, more tree heaths, lobelias, and white everlasting flowers. The air was now quite cool, like that of northern Europe; nothing but the extraordinary vegetation and the line of black porters reminded one of the tropics. This plain resembled that below in its silence and gloom, and the Duke, pushing on rapidly, outstripped his men, and at the next refuge, Bujongolo, spent a tentless night in the open. Again the shelter was an overhanging wall, reeking with damp, but each successive camp became worse than the last. When the tents arrived, tree heaths and lobelias were cut down to make platforms, otherwise it would have been impossible to erect them; as it was, they stood above one another in two groups of three, separated by an enormous boulder. Far below ran the Mobuku in a deep ravine. Overhead the rain came down pitilessly, and the mists chased each other in and out among the

mountains, so that even here the Duke had very little idea where he was. It was now becoming clear why so many people had failed, but the Duke's resources were unlimited, and he brought up more porters and more food.

The Duke, his three Swiss guides Petigax, Ollier, and Brocherel, with five negro carriers, now went on to try to discover something about their surroundings. The way grew steeper, and the treacherous moss-covered stones proved an insuperable obstacle to the natives, who were sent back. A little later the four Europeans were also compelled by mist and rain to stop, and to pitch their tent on the mountain side. Next day, however, they reached a high saddle between the peaks of Mount Baker. The Duke's good fortune smiled on him for an instant; the weather clearing, they could now make out the nature of the topography, and of the various mountains which are comprehended in the name Ruwenzori. They were standing between the highest points of the mountain up which all previous explorers, except Stuhlmann and Stairs, had toiled: Mount Baker proper on their left hand, and a new peak, recently conquered by Wollaston, on their right. At their feet the saddle fell away into a great vertical precipice, whose base was washed by the Bujuku River, and beyond the valley of this stream were four distinct mountain masses, some of whose peaks soared far above anything on Mount Baker.

It was now plain that they ought to have gone up the Bujuku in the first instance, and not up the Mobuku, which was only a tributary. The most distant of the four mountains was decidedly the highest. It could only be reached by descending and completely encircling Mount Baker, the vertical precipice being impassable, or by returning the way they had come, sacrificing all

284 Modern Exploration — Triumphs

their toil, and reascending by way of the Bujuku. Naturally, they chose the former course.

They first climbed Mount Baker, partly to get a more complete view; but even as they reached the summit mist descended upon it like a candle-snuffer, and although they remained there four hours, shivering in the bitter cold and damp, they could see nothing but the dispiriting wall of grey fog. Eventually they retraced their steps, and the next morning returned to Bujongolo.

Ruwenzori deals out his favours grudgingly. The next day it rained, and the next, and the one after that. The little camp, its tents perched like toys among the giant boulders, was washed with water from heaven and stained with water from the muddy rocks. The mist wreathed and curled up and down the valley fantastically, and the Duke, who described this place as a "dungeon", could only sit in his tent and listen to the pit-pat of falling drops. Some variety was provided by a leopard that one night appeared in the camp, and carried off two sheep. The next day it appeared again, but becoming alarmed made off before anybody could seize a gun. These leopards sometimes reach the snow on Ruwenzori, for Sir Harry Johnston noticed the footprint of one on a glacier.

On 15th June, a fresh start was made, beginning with a descent and a great curve round the bastion of Mount Baker. Overhead hung the precipices, underfoot were the pools, the morasses, the white everlasting flowers, crinkling like paper, and the mud. To plunge along in such places was equally wearisome to the knees and to the mind, but it had to be done. At this point the negro carriers, who knew that one summit had been attained, and who saw no sense in going farther, began to give trouble, but they were driven reluctantly forward. The Swiss guides, forsaking their proper vocation, took axes,

and cut down a path through the everlasting flowers and the groundsel. In this way the caravan came at length into the valley which it had seen from Mount Baker. To the west, beyond two small lakes, only lower ground lay, and beyond that, filling up the horizon, was the vast Congo forest, with its massed battalions of billowy curving tree-tops. Out of here Stanley had fought his way seventeen years before, and was defeat to be imagined now, when a few miserable bushes alone defended the peaks? Perish the thought! For the first time for several days the sun came out during the afternoon, and sinking soon after, wrapped the tips of the trees in a blaze of crimson glory.

The next day the porters again refused to proceed. They had never been so far. The spirits of the mountain would tear them limb from limb. And so on and so on. They knew no Italian. The Duke knew no Waganda. Cajolery and bullying took the part of explanation. The frightened men picked up their loads, and they all marched on. Such occasions are always unfortunate, but this world is made up of drivers and driven.

Much time was now lost in a jungle of bushes which lay between two small lakes and the western face of Mount Baker, and through which they had to force a path. Eventually, however, this obstacle was overcome; and at last, greatly fatigued, but conscious of having the prize almost within his grasp, the Duke camped beneath the highest peaks. Mount Baker was now far away behind him. In front rose twin summits from a single base, connected by a high saddle. That on the left hand they named Alexandra, that on the right, Margherita, a pretty compliment to the reigning Queens of England and Italy. Naturally, Margherita was a trifle the higher.

Previous experience had taught them that it was hopeless to wish for fine weather, but at dawn next morning

286 Modern Exploration — Triumphs

the Duke and his three guides started, Petigax in the place of honour, and the Duke third. Of course, they were all roped together.

An hour's easy climb over the snow brought them to a glacier immediately below the two summits. It was now only 6.30 a.m., and prospects looked rosy, when suddenly the mist came down, just as it had on Mount Baker, and for all practical purposes they were blindfolded. They had noticed the right direction, however; besides, the Duke was not the man to turn back merely because it happened to be dangerous. Accordingly they climbed to the left; an hour later their alpenstocks were thrust in the soft snow on the summit of Alexandra Peak.

The mist was so thick now that they could not even see the other summit, although it was only a few hundred yards away. Their one early glimpse of it had disclosed a dangerous overhanging snow ridge or cornice, and in the mist it was exceedingly risky to try to climb up that way; on the other hand, to go back and try another day might be fatal, in a place where the weather was so continually uncertain. Any other mode of ascent, being wholly problematical at all times, seemed absurd now, when every yard was hidden by fog. Accordingly they decided on the cornice way. Soon the slope became so steep that they were almost vertically above each other, Petigax still leading. When under the snow ridge, a narrow gully of ice disclosed itself, which led to the summit, but it was six feet high, and in itself unscalable. At this critical juncture Ollier stood against the cliff, and Petigax, clambering on to his shoulders, with a sheer drop into the mist below if anything went wrong, succeeded in scaling the gully. He then lowered a rope, up which the others clambered. The deed was done, and Ruwenzori beaten at last!

This little bit of work occupied four hours, and though the glory was theirs the view was scarcely worth it; for all they could see was the summit of Alexandra Peak and a floor of rolling clouds. At this spot, as on the other summit, water was boiled, and a thermometer read in it, to determine the height. The twin mountain they named Mount Stanley. Margherita Peak, its summit, reached 16,815 feet above the sea, the twin being a few hundred feet less.

During the crossing of East Africa, Captain Cagni, the surveyor to the expedition, and the hero of the Polar record, had fallen ill with typhoid fever, and had been left behind at Entebbe. He recovered, however, and pushed on to the highest camp with all speed, so that when the Duke descended he had the pleasure of receiving his friend's congratulations.

Besides these pioneer ascents the expedition made many more, spending several weeks surveying and photographing. Upon their return the Mountains of the Moon were mysterious no more. The Duke came to London, and lectured on his travels to a great audience at the Royal Geographical Society's request, King Edward being present.

Alaska, the Arctic, and Central Africa by no means exhausted his energies. He reverted to the first idea he had conceived, of some great ascent in the Himalaya, and in 1910 he was in the wildest Karakoram, with an equipment as large and as carefully organized as the African one had been. The mountaineering conditions were much more severe than those of Central Africa, for the Himalayan peaks, if of rock, are often quite unscalable, and if covered with snow are usually unapproachable because of the incessant avalanches. However, the Duke made an attempt on Mount Godwin-Austen, which failed; he then attacked a smaller summit,

288 Modern Exploration — Triumphs

the Bride Peak, 25,100 feet high, and though unsuccessful in reaching the summit, attained 24,600 feet above the sea. Bad weather and the treacherous nature of the last 500 feet alone defeated him. This is the greatest altitude to which any human being has ever climbed, with the sole exception of those attained in the Everest expeditions.

CHAPTER VII

The Attainment of the North Pole

We can now return to the efforts of the Americans to reach the North Pole by way of Greenland.

It will be remembered that when we left Peary he had successfully transported the 90-ton mass of meteoric iron to New York. This was in 1897. For seven successive years he had endured the icy blasts and exile of a sojourn in the northern wastes. He was forty-one years old. The renown that he had acquired as the result of continuous efforts to explore North Greenland would have satisfied most men. Nevertheless, Peary felt that his life's work had only just begun. His object—the attainment of that geographical point which had been the aim of adventurous and hardy men for 400 years—was as far from realization as ever, and until he crossed the frozen ocean and planted the Stars and Stripes at the Pole, all rest, ease, and the enjoyment of honours must be rigorously put aside. Accordingly, no sooner was the huge stone safely past the Statue of Liberty than Peary projected a fresh expedition to Greenland, and set about the ways and means of launching it.

He was not a rich man, for the rewards from his lectures and books were wholly absorbed in paying the expenses of his journeys. Officialdom, too, looked askance at this energetic person who persisted, year after year, in useless endeavours to reach a spot, the attainment of which would benefit nobody. The leave that he desired for the new journey was refused him. Nothing

290 Modern Exploration — Triumphs

daunted, he brought other forces into play, and by the personal intervention of the United States President on his behalf the previous decision was reversed. Now came the difficult question of funds. Peary had become somewhat of a national hero; for he was intensely patriotic, and his persistent endeavours to plant his country's flag farther and farther north appealed to the popular imagination. Between being a hero, however, and obtaining the money for practising one's heroism there is a tremendous gap. The mind of the people, distracted daily from one object to another, and ever conscious of its own woes in bad trade and such-like hardships, is apt to be blank when appeals for money are made to it. Consequently, the method that was adopted to provide Peary with funds for his work was perhaps unique. His staunch friend Morris K. Jesup founded the Peary Arctic Club, into which admirers of the explorer would pay donations, and from which the money would be found to finance each journey, for it had now become a settled conviction, both in Peary's mind and in the minds of his more intimate friends, that he would never rest until success were his, even though it meant a dozen journeys to the north. From overseas, also, valuable help arrived. Alfred Harmsworth, afterwards Lord Northcliffe, had sent the Jackson-Harmsworth Expedition to Franz Josef Land, in the *Windward*; and when it returned, bearing Nansen and Johansen on board, he presented the vessel to Peary. She was not suitable for pushing through heavy ice, but she was a useful yacht, and Peary gladly accepted her.

Thus all things conspiring in his favour, he set his face northwards once more, from Sydney, Cape Breton, on 7th July, 1898, with a large company on board. This expedition, which was to last four years, proved the most trying and arduous of his whole career.

Nothing more was to be learned from the Greenland ice cap, and he now planned to follow the route of the older voyagers by taking his vessel through to Robeson Channel, and to winter there. In the spring, sledge journeys would be made along the shore of North Greenland, with the hope of surpassing Lockwood's farthest, and direct for the Pole, with the hope of beating Nansen's record. The scientific work would be mapping, coupled with tidal observations and meteorological records. As all his previous work had been done with the consciousness that the frozen seaway provided at best only a poor route to North Greenland, it was obvious that trouble must be expected.

The *Windward* proved quite unsuited to the severe work of battling with the chaos of hummocky floes, but she carried her crew safely into Kane Basin, and pulled up at an impassable barrier. Good winter quarters were found near Cape d'Urville, on the shore of Ellesmere Land; and during the autumn and early winter much work was done; bears and musk-oxen were hunted, to provide fresh meat, and a depôt with $1\frac{1}{2}$ tons of supplies was advanced 80 miles north of the ship. In this work the Eskimos were again pressed into service; keenest of hunters, and most skilled of ice-men, they proved invaluable.

During this preliminary work Peary had his first real taste of the ice-foot, a feature which has always been heartily abhorred by Arctic travellers. Theoretically, it is a platform, glued to the coast, and separated by cliffs of ice from the younger sea ice which is in motion every season. Actually, it is a chaos of shattered platforms, never at the same level for more than a few hundred yards, broken by cliffs and slopes down which one must glissade, and sometimes so crushed and fractured as to be almost impassable. Being the only alternative to the

292 Modern Exploration — Triumphs

ice in the channels, which is even worse, it forms the only practicable highway for sledges; but in order to get along at the worst places men have to risk a fall of anything up to fifty or sixty feet on to the hard sea ice below, while their sledges are wrenched and strained by the continual bumps and glissades on the atrocious surface.

Having failed to get the ship through Kane Basin, Peary was desperately anxious to carry supplies so far northwards that the next spring might not be lost; for unless an attempt on the Pole is made early, the ice covering the Arctic Ocean becomes seamed by wide lanes or leads of open water, while the surface of the floes degenerates into slush through which no amount of force can drive the sledges. Fort Conger, Greely's old station at the southern end of Robeson Channel, would make an excellent base for the northern operations; and thither, by travelling in the darkest part of the winter, Peary endeavoured to penetrate.

On 20th December, 1898, he left the ship with six men and thirty dogs. The $1\frac{1}{2}$ -ton depôt was soon reached, and the opportunity was taken to carry it still farther north; then Peary went on with light sledges and a minimum of men and material, in order to reconnoitre Fort Conger, which was still 150 miles off, and to see what use could be made of it. Owing to constant storms, violent gales, and deep soft snow they made poor progress; the supplies were rapidly consumed, and to make matters worse, the moonlight failed, so that they had to march by the cold, indifferent light of the stars or the impish flashing of the aurora. Naturally, under such conditions the difficulties of the ice-foot were intensified; nevertheless, Peary was determined to get through Kennedy Channel, and at last he brought his weakened party to its northern end. Across a wide opening, known

as Lady Franklin Bay, lay the Fort and the entrance to Robeson Channel, but this opening was choked with hummocks in utter confusion, and in the darkness its traverse could be accomplished only with the greatest danger. Now and again the floes, moving uneasily, crashed together with an awe-inspiring sound, huge masses being thrust up by the pressure as if they were paper; at other times the desolate place was silent, save for the whistling wind. Everything stood in shadow, so that one ran up against sharp obstacles before there was time to avoid them, or to check the momentum of the sledge.

Peary realized that he could never cross the Bay in his present condition, for his feet were giving him great trouble from frostbite—and yet everything depended upon him. He decided to make a burrow, in which he left two Eskimos and nine of the weakest dogs; then, with the remainder, he attempted the crossing. It took two forced marches, one of eighteen hours, in almost complete darkness, and at the end they had to kill a dog for food before they reached the Fort. Happily the place proved to be intact, while the stores that had been left there were still usable. Greeley's papers and records were also found, and were eventually conveyed back to the United States.

Peary paid dearly for his temerity in this winter traveling. Neglect of his frost-bitten feet had resulted in their both becoming hopeless, and nothing could be done to restore the circulation, although he lay there helpless from January 6th to 19th February, 1899. His party used up the old stocks of corn meal and molasses, breaking up boxes and barrels for fires. At the end of this time, the leader's feet not having recovered, he was strapped to a sledge and carried back to the *Windward*, the frightfully rough journey of 250 miles being covered

294 Modern Exploration — Triumphs

in eleven days. During this march the temperature once fell to minus 65° F., i.e. 97° of frost, and it was never greatly warmer. A fortnight after his return, his feet making no progress towards recovery, eight toes were amputated. This was on 13th March. Yet on 19th April, only six weeks later, he started off again for Fort Conger, undeterred by previous failures, inspired only by a grim determination to attain his end.

During the spring journeys of 1899, twenty-five musk-oxen were killed, and were buried as a reserve of meat.

Peary, after arriving at Conger, essayed to go north through Robeson Channel, but the broken ice proved too difficult, and as his feet were giving trouble he returned to the ship, resting there throughout the month of June. It was now far too late to do much useful work in the north, but July found him setting out for the minor ice cap which covers Ellesmere Land, with the object of discovering whether it was one and the same island as Grinnell Land farther north. Owing to the summer melting, deep pools and channels interrupted the surface of the ice, and it was sometimes necessary to wade waist-deep through the obstruction. Clothes and equipment alike became sopping wet; at times the party even slept in several inches of slush. Despite these difficulties he successfully made the crossing, and proved that the two formed a single island.

During the autumn he changed his quarters to the Greenland shore, which was more convenient for access to his Eskimos, besides offering a better chance to a ship, and in August he sent the *Windward* home. March, 1900, saw him back again at Fort Conger, eager to attack Robeson Channel once more.

The ideal method of attempting to reach the Pole (and that which he was ultimately forced to adopt) was to jump off from Cape Columbia, on the north coast of

Grinnell Land, but this involved transporting all his supplies nearly as far from Conger as Conger was from Etah, and at that late season failure would have been certain. He therefore put it off for yet another year, and devoted the present season to completing his Greenland labours by mapping the coast to its most northerly point.

They left Conger on 9th April, 1900, and had made but a single march when the best Eskimo became ill. Peary, whose attention to his men was unremitting at all times, took him back, while the rest of the party crossed Robeson Channel to the Greenland shore. When he joined them again they were held up by the jagged ice foot; and in order to make any progress at all it became necessary to hew a way with axes through the least rough places, and then to haul the sledges along the road. They worked on the principle that a mile made was a mile gained, with the inevitable result that they succeeded in forcing a passage out at the northern end of Robeson Channel. At that place, as we have explained, was the wide opening of Lincoln Sea, where some open water was always to be found during the warmer months. Peary's party encountered a channel more than three miles wide, stretching from shore to shore. Sometimes at such places there was just sufficient rock and ice-foot to enable the sledges to creep past; at others the cliffs fell sheer into the sea, and the unhappy explorers had to wait until the cold of night formed a thin skin of ice on the sea, when they would gingerly cross it. This was the manner in which the wide lead at the entrance to Robeson Channel was negotiated. The young ice was obviously unsafe, yielding and cracking beneath each man's weight; but warmer weather must follow, when there would be no ice at all: the ice-foot also failed them here. Peary sent an Eskimo ahead, himself following at a respectful distance; two other Eskimos followed in

296 Modern Exploration — Triumphs

the same manner, and as the ice held the remainder got across. They had not proceeded far, however, before a precisely similar obstacle held them up again.

At this juncture two of the Eskimos became frightened. Peary, whose invariable policy was never to use force with them, sent them back; leaving him with only Henson and three Eskimos. Again a thin cake of ice filmed the surface of the sea. Again the party trod daintily across it, their good fortune sustaining them for once; but the sledges were kept a hundred yards apart, and each man walked at some little distance from his sledge, so as to spread the weight. Shortly afterwards two more Eskimos were sent home. Peary, Henson, and one Eskimo continued the journey, with three sledges and sixteen dogs.

At the open lanes long detours were made, and sometimes the little party ran into sludgy snowdrifts, and all three of them had to tug at each sledge before it would budge. Slowly, but inevitably, the miles and the known landmarks passed to the rear. Perseverance was winning all along the line.

At last they reached Lockwood's farthest, the hitherto known end of Greenland. The record of the earlier explorer was still in good condition, although it had been there eighteen years. Peary made a copy of it, and took away the original.

They now crept on, past one savage cliff after another, until they had rounded the northernmost point of Greenland, which they named Cape Morris Jesup, in honour of the explorer's friend and patron. Now, as farther down the coast in 1892, the welcome and unaccustomed movement of figures ahead disclosed the possibility of fresh meat, and soon the cliffs re-echoed to the crack of the rifles, as musk-ox, bear, and hare sank to the ground.

While on this coast they were constantly enveloped in

dismal fogs; yet Peary learned sufficient of his surroundings to make it clear that northernmost Greenland was no place from which to base an attack upon the Pole.

The long journey back to Conger involved several risky crossings of thin ice; but fortune remained with them throughout, and they were safely in the Fort by 10th June.

The third winter of their exile was spent at Conger, largely in pursuit of game. During the dark months, likewise, Peary prepared for his first real Polar journey. On 5th April, 1901, accompanied by Henson, one Eskimo, two sledges, and twelve dogs, he bade good-bye to those at Conger, and turned his face northwards. Strange thoughts must have passed through his mind as the little station slowly disappeared from view. It was his eleventh year of striving, and now for the first time he was really aiming direct at the mark. Whatever his thoughts, he was soon to receive a rude shock.

The passage of Robeson Channel proved dreadful; and by the time they had reached Lincoln Bay everybody was worn out, the sledges were damaged, and the dogs were no longer pulling. It was 17th April—too late to make another effort, too far from help to do anything but go back. Peary gave the order to return; the Fort was abandoned; and the whole expedition found itself once more in Smith Sound, where the *Windward* was brought up. He decided to make one more effort; wintering at Payer Harbour, on the Ellesmere Land coast, opposite Etah.

Peary had the pertinacity of a spider. Through the winter of 1901, two depôts were again re-established along the jagged coast towards Conger; the health of the party was maintained by a constant supply of fresh walrus, reindeer, and other meat. The *Windward* went home again, leaving Peary and his veterans to battle with the

298 Modern Exploration — Triumphs

Arctic winter for the fourth successive year. During this autumn his loyal Eskimos were ravaged by disease, and several died; otherwise the time passed uneventfully.

On 6th March, 1902, Peary once more set out for Conger, with the last of many sledges; successfully traversed the 300 miles to that lonely hut; and rested there for a few days, while the sledges were overhauled and about a hundred hare were added to the larder. On 24th March he started north from Conger with nine sledges. The lesson of last season had been duly learned, that a small party could not hope to get on unless it conserved its strength by allowing supporting parties to do the spade work.

Round Black Cape, the N.E. point of Grinnell Land, it was necessary to hug the cliffs. Peary describes the ice-foot here as "villainous", the road having to be hewed almost continuously, but the sledges were forced round it. They reached a former camp of the *Alert* expedition, and stopped there. Near this place two men nearly lost their lives, a sledge slipping when they were on the ice-foot edge, with a drop of fifty feet to the jagged blocks below. At another point, Cape Joseph Henry, the sledges had to be engineered round a shelf of ice less than 3 feet wide, and 75 feet above the floe. Shortly afterwards three Eskimos were sent back, leaving four with Peary, besides Henson.

They now struck straight out to sea. Near land the pack ice was piled up into hummocky ridges that had been created by the pressure from the Pole, and through the chaos of blocks, spires and rubble a path had to be hewed, the first day's work yielding only five miles. Interspersed with the hummocks were areas of deep snow, where the sledges stuck, and nothing but furious shoving and hauling could get them out again. Nevertheless the second day yielded another five miles. Finally,

on 12th April they were stormbound by a gale from the N.W.; and that was followed by long channels of open water, which could be crossed only by making long detours, or by waiting till they closed again. One of these channels, in particular, marked the point where the sea deepened rapidly to the Polar Basin, and this acquired an unenviable notoriety as the "Big Lead". Peary persevered, however, but day after day the same thing happened, and at last, in a maze of hummocks and deep snow, he gave it up. It was 21st April, 1902; the latitude $84^{\circ} 17' N$. He struggled a short way ahead of his men, down to the waist in sludge and fragments of ice. Nansen's farthest was hopelessly out of his power to attain, still less, of course, could he emulate Cagni's record of 1900. For the first time his notes, made on the day, show signs of despair. The game, he wrote, was off. But even as he speeded back, beaten, to Conger, his eager mind was planning fresh efforts, with new equipment and by different means.

It was touch and go whether he ever got to Conger. Forced marches were made, so as to utilize the outward trail, but fresh snow had frequently obscured it, while the movement of the floes had altered its place; thus, at one spot, a lead had closed, and was now represented by a huge line of hummocks 75 to 100 feet high. Peary noted with anxiety that the entire surface was drifting rapidly to the east, away from his objective. The hummocks gave much trouble; and at one place, a lead opening suddenly almost engulfed two sledges and the dogs pulling them.

No man ever drove harder or more directly than Peary. When they were two days distant from Grinnell Land a violent storm pinned them down to their camp for forty-eight hours, and when it gave over the densest fog prevailed, so that he had to steer by compass; never-

300 Modern Exploration — Triumphs

theless, and knowing too well the risks, he gave the order to go on. At last they won through, but it killed two dogs, and exhausted the men. At one camp near land they noticed their old igloo in ruins; a lead had opened right underneath it, so that "the halves . . . stared at each other across the chasm".

May saw the whole party back once more at Payer Harbour. On 5th August, the *Windward*, with Mrs. Peary and her daughter on board, steamed up to the shore; the Eskimos were returned to their homes, with a good supply of walrus meat, and Peary went south.

Three years elapsed, years of planning, of hopes in which no pessimism shared, despite all that had gone before. The Arctic had won hitherto, but Peary's resources were not exhausted. If only he could get a ship through Robeson Channel, he imagined that he would have a much better chance of success. The weakness necessarily arising from the continual struggle with the ice-foot would be avoided, and he could start fresh. He also planned to take supporting parties out upon the ocean, in the same way as had been done by Scott in the Antarctic; there was the difference, however, that Scott's "ground", though afloat, scarcely moved, whereas Peary's would be certain to alter almost from day to day.

The Arctic Club found the money. A great and dominant personality blessed the enterprise, and in his honour the ship, which had been specially built, was named the *Roosevelt*. Leave was now granted to Peary, who at that time had the rank of Commander, for one more attack on the Pole, and in the summer of 1905 he started north again, with fresh comrades and renewed hopes; in addition to the loyal Henson, a constant reminder of previous failures.

Captain Bartlett, a Newfoundlander, manœuvred the ship with rare skill through ice which would inevitably

have wrecked the *Windward*. They followed Greely and Nares mile by mile through Kennedy Channel, Robeson Channel, and on to Cape Sheridan. The ship was often in great danger; but always Providence watched overhead, and she escaped. Safe winter quarters were found near Cape Sheridan, and in the next spring Peary made his effort.

His organization had triumphed over every obstacle. The supporting parties understood their work, the heads of the sledges were steadily nearing the Pole; when Nature reasserted herself in an instant, and blew Peary's plans to fragments. When they were in the 85th degree a furious gale sprang up, lasting a week; the subsequent movements opened wide lanes in the ice, and the Commander was separated from his supporting parties. He pushed on, and had the meagre satisfaction of beating Cagni by thirty-six miles, but the Pole seemed as remote as ever. He had gone to the limit of his supplies, and he and his party scarcely got back alive. At the big lead there was an accident, three men only just avoiding death, but by great good fortune all were at last assembled on board.

Bartlett took back the *Roosevelt*, displaying the same consummate ability as on the outward journey; and so ended another chapter. Peary was defeated once more, but he could claim at last the title to the "farthest north".

However, that was not the Pole. He had spent his best years in one aim, and he refused to be overcome now. The ship was refitted, Bartlett was induced to go again. In July, 1908, Peary sailed on the last and greatest of his adventures.

Again the ship successfully passed the packed floes, anchoring almost in her quarters of 1905-6. Again a busy winter passed in eager preparations. Again, in the middle of February, a long line of fur-clad figures,

302 Modern Exploration — Triumphs

barking dogs, and heavily-laden sledges set out for the Pole. This time everything prospered.

Bartlett went with the advance party; other supporting parties were to go to definite points, and then return; while Peary, at first in the rear, would gradually catch them up, husbanding his own strength and that of his men; and eventually he, with the best of those who remained, would dash for the Pole. When they started there were 7 white men, 19 Eskimos, and 140 dogs, with 28 sledges: he must have smiled, if he recollected the Greenland days, when he thought a small party the best! Several sledges were wrecked on the rough surface, but the Commander's forethought had provided for that, a reserve supply having been established on the Grinnell Land coast.

At the Big Lead the first supporting party turned back. Peary had with him two reels of piano wire for sounding; and near here a sounding showed that they had rather less than a mile depth of ocean beneath them. With a repetition of the usual incidents the remainder pushed on to $85^{\circ} 23'$, where the second supporting party turned back. There were now left 12 men, 10 sledges, and 80 dogs; they had continual daylight; and were favoured with fine weather.

With the happenings of 1906 in mind, marches were so arranged that when Peary came up Bartlett went on, and vice versa; thus, there could be no fear of a separation from the essential food supplies.

Latitude $86^{\circ} 38'$ was passed, amid much rejoicing, for every mile gained now meant a fresh record. From this point Professor Marvin returned with the third supporting party; but alas! it was not so easy to return as it had been to go out. At the edge of the Big Lead Marvin somehow overran his sledge, fell into the sea, and was drowned.

Meanwhile the others were gradually nearing the goal. Patches of bad snow, of thin ice, of hummocky rubble could not stop them; for the leader had determined to take no chances with the weather, and he forced them on as hard as they could possibly go.

At 87° 48' Captain Bartlett turned back, with the last supporting party; from this point onwards only Peary, Henson, and four Eskimos remained. Peary reckoned that five good marches would bring him to the Pole, and with hardly an incident the distance was covered. When they arrived at the Pole, hardly knowing what they expected to find, a boundless plain of snow and ice, utterly bereft of life, and broken only by the lines of hummocks due to floe motion, met their gaze on every side. The hard-fought battle was over, and Peary, bearing the scars of twenty years, had won.

To make sure of his position he carefully took a round of angles of the sun's altitude, lying flat on the ground, sheltered by a low snow wall, and pointing his sextant at the luminary, which, of course, was low on the horizon. He also took a sounding here; but he had only 1500 fathoms (rather less than two miles) of wire left, and it failed to reach the bottom. While being hauled in, the wire broke, and was lost.

The return journey proved uneventful, except for the remarkable speed at which it was accomplished; for two outward stages were frequently covered in one day's journey. Of course, the outward trail was there to aid them; a fierce gale at their backs also helped them on considerably. On 23rd April, after no great difficulty with the leads, they were back again at Cape Crozier. The last two marches to the ship, each of forty-five miles, were actually covered in two days. This would have been a wonderful performance for a man of Peary's age on any surface. It shows conclusively that, besides his own splendid

304 Modern Exploration — Triumphs

condition, he had an unusually favourable season and an exceptionally fit personnel.

Peary returned home in triumph, marred only by the shadow of an impostor. Dr. Cook, who had been on his 1891 expedition, and had been in Grinnell Land during the successful venture, had anticipated him, by asserting that he had reached the Pole already. Of this infamous fraud it is not necessary to say much here. Cook's records would not bear examination; and the Eskimos who accompanied him declared that he only slept two nights on the ice. He succeeded, however, in creating a certain number of partisans in the United States, and for some years annoyed the great explorer, until at length he sank into the darkness and obscurity he deserved.

Peary was created a Rear-Admiral after his return home. The honours he had so hardly won were his to enjoy for only a brief space of time; for he died at his Washington home, 20th February, 1920, after a long illness. He was only sixty-four.



1. 563

SNAEFELLNESS RANGE FROM HELGAFELL, ICELAND

From a photograph by J. H. Reynolds, Royal Geographical Society

CHAPTER VIII

Dr. Thoroddsen, Geographer of Iceland

In the history of travel, as in that of science, it has more than once happened that a man has gained fame solely by confining himself to a small sphere and to the determination of a definite object. Such men are true pioneers. They need not work in unknown or uncivilized lands; for even in his native country the explorer often has much to learn.

A noteworthy instance of this is William Smith, the celebrated English geologist, who flourished at the beginning of the nineteenth century. Like Peary he was a land surveyor by profession. He had, however, early learned to understand the value of fossils for dividing rocks into series according to their age; and at that period the method was novel and not at all well understood. Smith had to tour the country on account of his profession, and he made it his business to visit every rock exposure which he could, and to map it according to the fossils. When the work was done he had to publish it in manuscript. This was the first geological map of England, and it had a great influence on all subsequent labours.

The subject of this chapter, living nearly a century later, was a man of similar tastes, a student, teacher, and geologist, by name Thorvaldur Thoroddsen, a native of Reykjavik, Iceland, where he was born in 1855.

306 Modern Exploration — Triumphs

Iceland is a small country. Moreover, it is on the tourist lists; so that one would not imagine that much could come to light through any teacher's wanderings there. As a fact, however, it is so barren in places, so difficult of access and unvegetated, that up to the commencement of the present century very little was known about many parts, and nothing whatever about others, beyond what Thoroddsen had discovered. The island is extraordinarily difficult to traverse, possessing a most complicated coastline and with an interior plateau 1500 to 3000 feet above the sea, which is overspread by lava plains, sandy wastes, torrential rivers, and ice-fields. Large areas yield absolutely no vegetation, not even grass, and as there are no railways across these wildernesses it was almost impossible to pass them, as one could not carry enough fodder for the horses.

In 1881, Thoroddsen, who at the time was a teacher in the capital, started to remedy this ignorance. He determined to map the whole country bit by bit, traversing one area during each of his summer holidays, for that was the only time when such work would be practicable, the severe winter cold, the fogs, snowstorms and gales, making it impossible to travel far from the inhabited lowlands. The work was entirely voluntary, and some years elapsed before its value and significance were realized. Eventually, however, the Iceland Storting made him a grant; while Mr. Oscar Dickson, the munificent patron of Nordenskiöld, Nansen and many other travellers, also provided funds for the mapping. Thoroddsen continually enlarged his zone of work, until in 1898 it was finished, and he had acquired a European reputation. Let us see how he did it.

When he commenced his labours there was no map of the interior, for in many parts human foot had never trodden. During his early rambles, however, he learned

that the dreaded deserts were fringed by a few small oases, two or three days distant from one another; and by getting into conversation with the shepherds, who alone knew where these oases lay, he fixed their positions, and was enabled to base his subsequent travels upon them. This gave him a much greater mobility than his predecessors, because he needed only to carry two or three days' fodder at a time. Hence, one regular and unique item in his equipment was a scythe and rake, for mowing and collecting the grass.

On every journey he had to contend with rain, fog, sandstorms, and snowstorms. All were objectionable, but the fog was the worst, because it destroyed the visibility essential for map-making, and it might hang about for days; besides, it often necessitated tedious ascents of mountains several times before key points could be trigonometrically fixed.

Thoroddsen had his first taste of the joys of a wild life in 1876, when he accompanied Professor Jöhnstrup's expedition to study some of Iceland's many volcanoes. In 1881, when his own work began, he wisely devoted the first season to preliminary journeys, so as to acquire experience of the difficulties to be overcome. At first he travelled alone, but subsequently he was accompanied by a former pupil, O. Sigurddson. They had a small tent, two hardy Iceland ponies, and an absolutely minimum amount of equipment.

The start of the work proper, in 1882, was not auspicious. The ice-floes from the Greenland Sea, crowding close against the north shore of the island, disseminated fog into the raw, damp air; and in addition to this difficulty, Thoroddsen could get no help and arouse no interest, for an epidemic of measles broke out, killing three in every hundred of the population.

Succeeding summers produced better results. He

308 Modern Exploration — Triumphs

had much trouble and difficulty with his work on the north and north-east coasts, where high hills, and even mountains, descend straight into the sea, buttressed on every side by the precipitous walls of winding fjords. On the tiny flats at the heads of these fjords a few lonely fishermen's huts constituted the villages; more often only a single house was to be found within many miles, the whole region being almost uninhabited, except by myriads of wheeling, screaming sea-fowl. There was no communication between the various places other than that afforded by the slippery, treacherous, and almost obliterated paths up and down the cliffs; at times, says Thoroddsen, when he descended to sea-level the spray broke over him, and the horses had to be unloaded so as to pass projecting rocks.

Although he was received everywhere with the traditional hospitality of the Icelanders, the poor people rarely had much to offer him; fishermen, shepherds, and fowlers all, they were often themselves dependent for a meal upon half-decayed gulls, seaweed, sharks' flesh, and other none too toothsome dainties. The results of this inadequate diet were that, despite their fine blue eyes and beautiful flaxen hair, the people often bore the marks of disease: scurvy, typhoid fever, and famine ever lurked in the vicinity of their homes.

When he was in this region it usually rained or snowed, or was cold and misty; while the mountains surrounding the fjords were knee-deep in snow, even during the summer. But the wild fascination of the black basalt cliffs, rising in one columnar layer above another, each the record of some ancient eruption; the rushing of the waterfalls, tumbling merrily down in giant steps from ledge to ledge, or perchance by one huge leap dissipating into thin air, and falling as rain; the beautifully poised flight of the gulls, with their ivory throats and their

wicked beaks, as they fought in the air or swooped down upon the green waters of the fjord; above all, the sense of loneliness and remoteness, the charm of the unknown, and the knowledge that he was doing a work that had remained neglected too long, all these things spurred the undaunted teacher on.

During the winter, in the intervals of his work at the grammar school (a duty which at a later stage was made honorary, but which must have borne heavily upon him at first), the results of these journeys were worked out. He wrote numerous articles for scientific papers; and you may imagine with what pleasure, pipe in hand, he would expound on some precious specimen, or discuss with a group of students the adventures and discoveries of the previous season. The language offered a difficulty, for if his scientific work were to be understood abroad, it must not be published in Icelandic. Accordingly, some articles appeared in Danish, some in Swedish, others were in German, and a general account of the whole appeared in our own tongue. All the scientific journals opened their columns to this plain, straightforward, and earnest student, and by that means, with the aid of correspondence, he kindled a growing interest in the breasts of foreign scientists, to whom Iceland has always been important, as it exposes phenomena that elsewhere are only seen under a mask. Gifts of books resulted, so that Thoroddsen gradually amassed that most valuable possession of a scientist, a good library. As his fame grew so his countrymen, at first neglectful, began to honour him, and eventually he was practically freed from his teaching duties, though still drawing his stipend.

In 1892, Thoroddsen fell ill, and had to go to a milder climate to recover. The next year he was back again; only to fall ill once more, this time with the dreaded

310 Modern Exploration — Triumphs

typhoid. This was in the middle of the summer, the only practicable travelling season; yet he remarks of it, characteristically, "however, I had pretty nearly done all I had planned to do that year".

On the most interesting, though most desolate region of Iceland, the interior plateau, he could travel only from July to September; earlier in the year there was no grass in the oases, and after the middle of September the weather became too bad. The interior is absolutely lifeless. During the Great Ice Age, which terminated some thousands of years since, the whole of Iceland was covered by glaciers radiating from the mountains. The high points all lie near the coast, so that many glaciers streamed inland, down to the plateau. They carried on their frozen bosoms great numbers of stones, the smallest being mere gravel but the largest as big as a house. To trace these stones to their sources, and thereby to reconstruct the history of the old ice streams, furnished work for many a day. The determination of the history of the volcanoes was another of Thoroddsen's regular occupations; and nowhere in the world could he have had better material. The walls of almost every fjord betrayed the history of eruptions in the greatest detail, flow above flow. The interior, likewise, was covered for vast distances by lava plains, the surface being sometimes coiled into fantastic ropes where the interior of the lava, cooling more rapidly than its crust, had forced up the latter; such places were often frightfully rough. Other flows were black and glassy, and many were half-hidden beneath a grey layer of dust, yet displaying their true nature in every cliff and gully. Besides the huge active cones, such as Hecla, there were many miniature volcanoes, little cones no bigger than a hillock, which, being bare of soil, displayed their structure like a diagram. All these things made his travels highly interesting to

The Geographer of Iceland 311

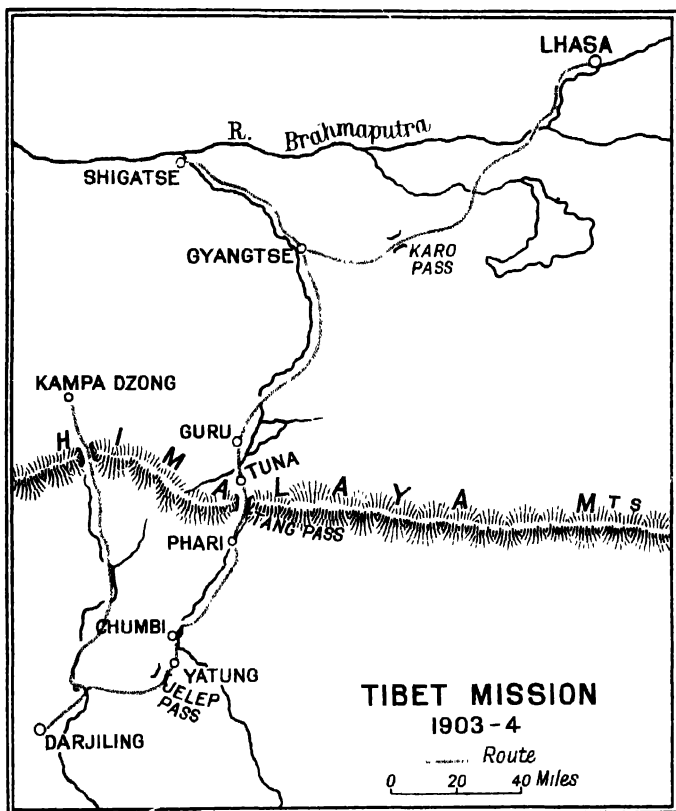
Thoroddsen, despite the difficulty of getting about.

One obstacle that the traveller encountered on the plateau was the glacial streams, which are liable to sudden floods, and at all times are sprawling and white with suspended matter. Never cutting any very definite channels, they run in a dozen braided streamways, galloping over the rattling gravel, and sufficiently fast and treacherous to make a slip dangerous. Sometimes they were spread over so wide a space that it took "a good hour or two" to ride across them.

A more formidable foe, and one which has on numerous occasions proved fatal to explorers, was the sandstorm. The loose surface, caught up by the high winds, would suddenly swoop down like a fog; myriads of tiny grains drifted into one's eyes, one's ears and nose—everywhere, in fact, where they could find a resting-place, and the journey had to come to an abrupt halt, for to wander about under such conditions might readily lead to destruction.

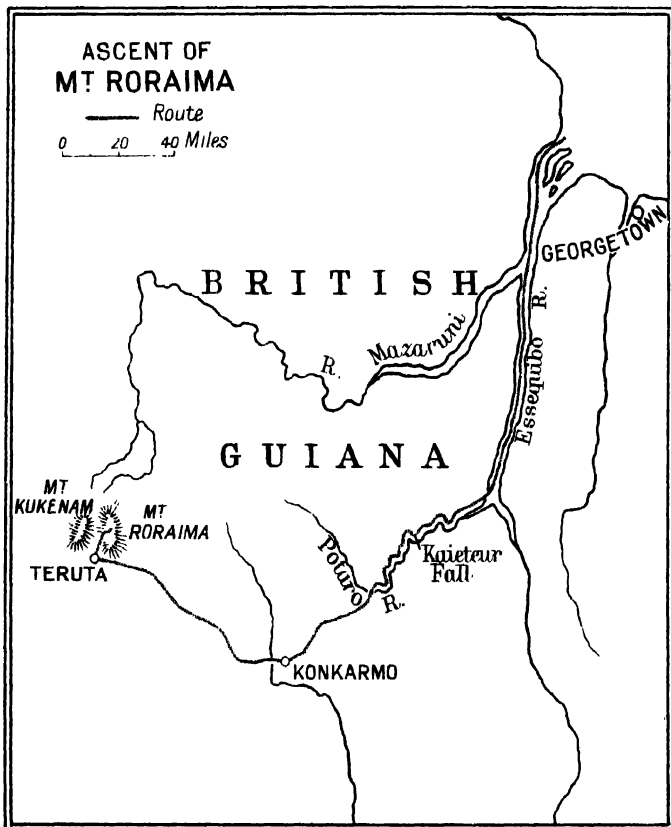
Dr. Thoroddsen lived more than twenty years after his great task was finished. He died at Copenhagen, full of honours, in 1921, being then in his sixty-sixth year. His life story is a sterling example of self-help and initiative, applied by a quiet student to one of the most useful of all labours, a knowledge of his own country.

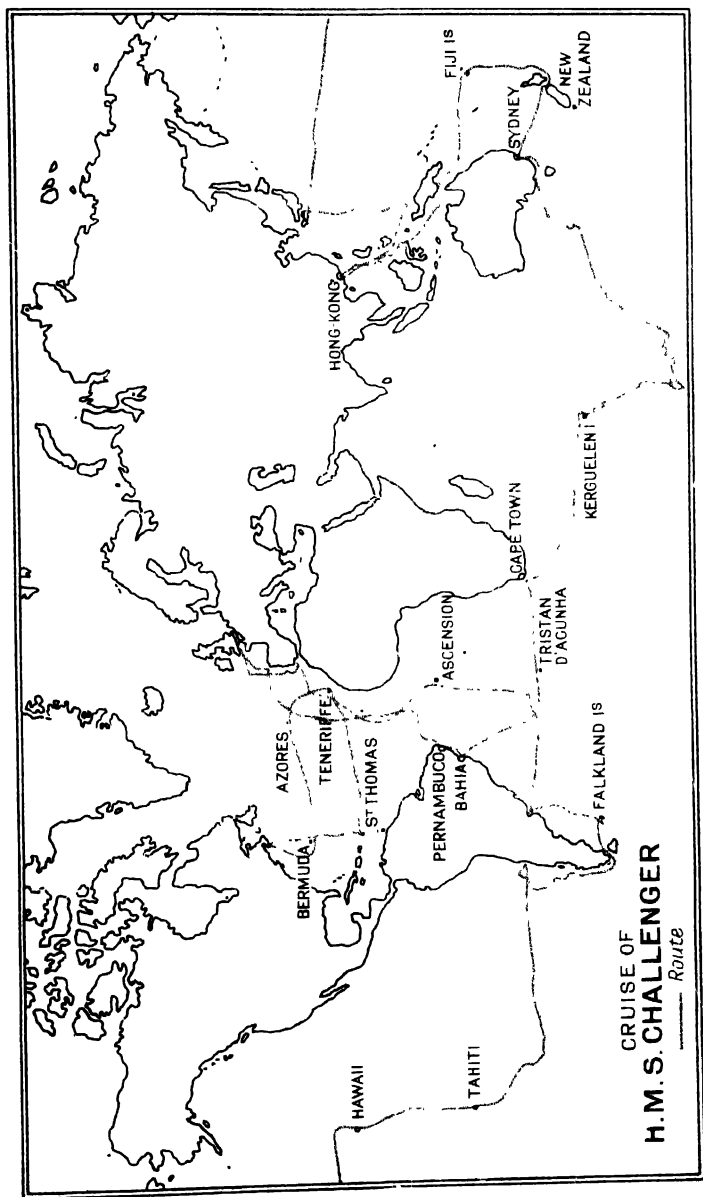
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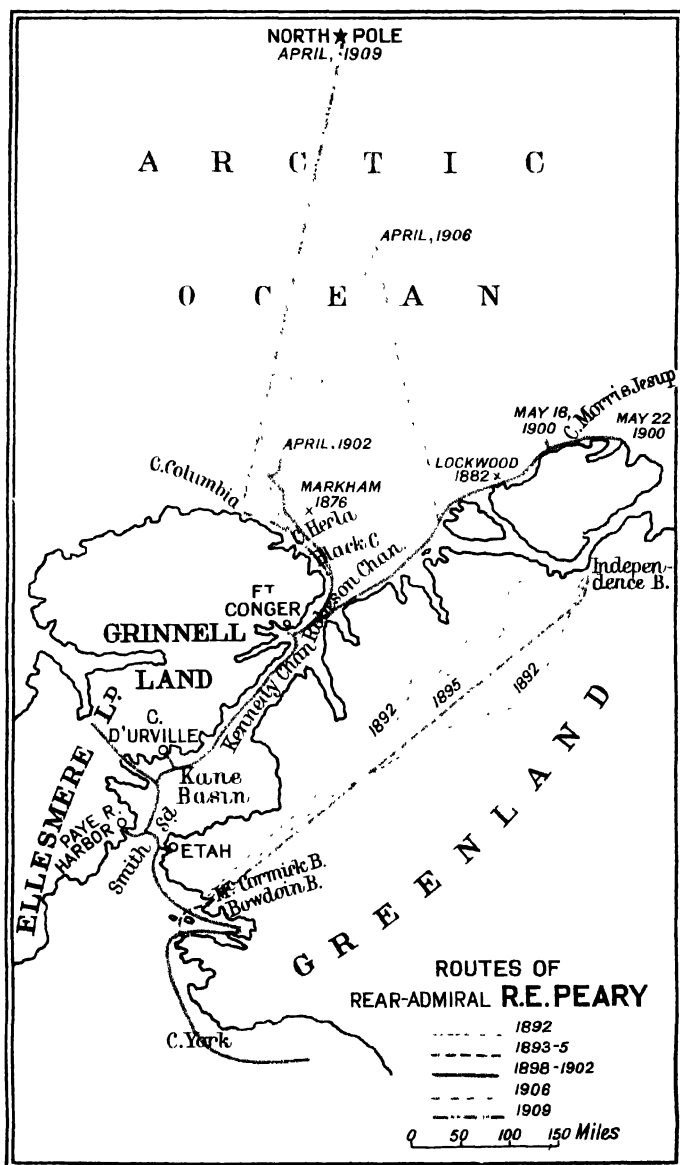


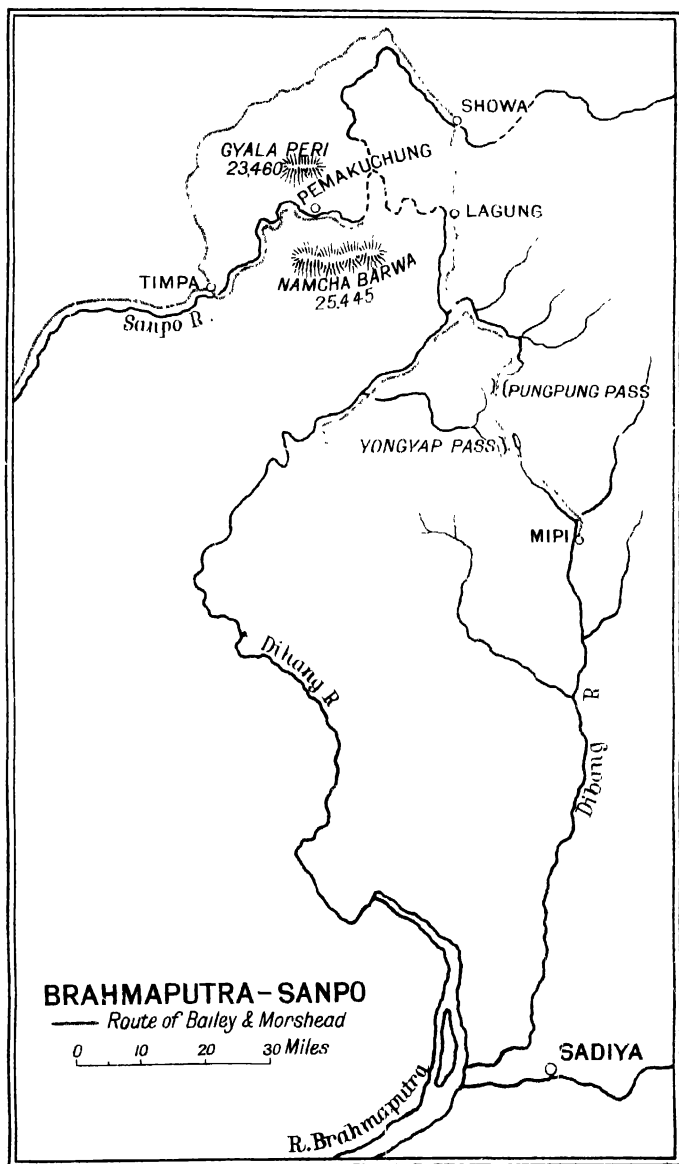
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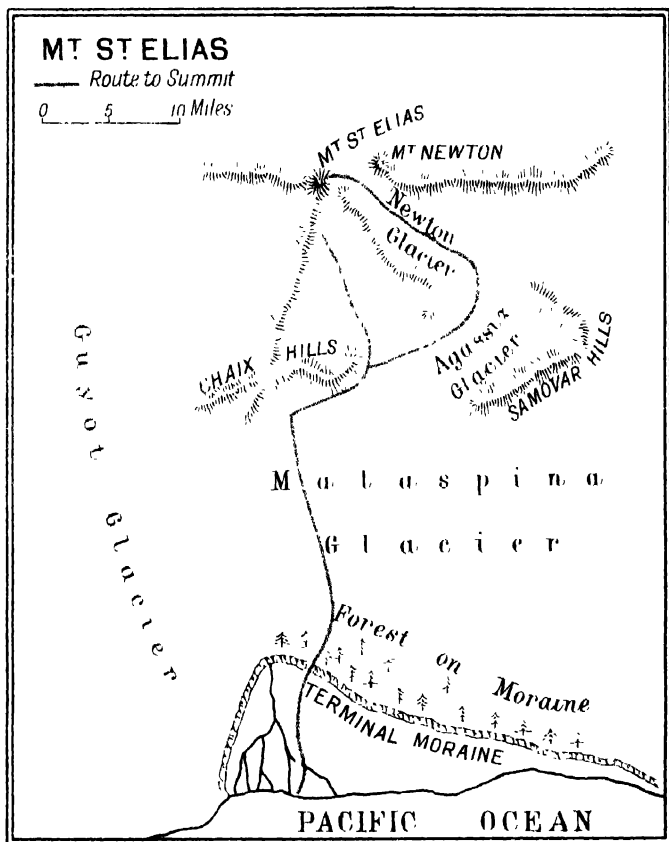




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